Министерство образования и науки Российской Федерации
Федеральное государственное бюджетное образовательное учреждение
высшего профессионального образования
«Томский государственный университет систем управления и радиоэлектроники»

КАФЕДРА ИНОСТРАННЫХ ЯЗЫКОВ

ENGLISH FOR ENGINEERING FACULTIES

Учебное пособие

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Настоящее учебное пособие составлено в соответствии с требованиями ФГОС ВПО направлений и специальностей технического университета и содержанием программы по иностранному языку для технических вузов.
Первый раздел (Oral Speech Course) содержит обязательные вузовские темы бытового и страноведческого характера, рекомендуемые к изучению.
Второй раздел (Reading Course) содержит адаптированные научно-популярные тексты и упражнения коммуникативного характера, а также включает тексты, несущие информацию об инновациях в современных коммуникационных технологиях.
Приложения (Appendices) включают в себя краткие сведения по фонетике и таблицы основных способов словообразования.

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Unit 1. PERSONAL LIFE

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Text A

MY FAMILY

Pretext exercises

1.1. Read the words and try to guess their meaning.

Student, university, radioelectronics, guitar, weekend, programmer, energetic, doctor, faculty, specialist, management, economics, Russian, France, April, October, system, engineer, computer, company, character, music, electrician, sphere, business, finance, pensioner, cousin, pilot.

1.2. Read the following words and notice their pronunciation.

introduce	[ˌɪntrə`dju:s]	ancient	[`eɪnʃ(ə)nt]
appearance	[ə`pɪərəns]	quite	[kwaɪt]
quiet	[kwaɪt]	event	[ɪ`vent]
guitar	[gɪ`tɑ:]	character	[`kærəktə]
sphere	[sfɪə]	electrician	[ˌɪlek`trɪʃ(ə)n]
pensioner	[`penʃənə]	finance	[`faɪnæns]
architect	[`ɑ:kɪtekt]	cousin	[`kʌz(ə)n]
enough	[ɪ`nʌf]		

Memorize the following words and expressions

for short	*для краткости; сокращённо*	**to have much in common**	*иметь много общего*
to be born	*родиться*	**to take part**	*принимать участие*

to be good (bad) at smth.	*преуспевать (не преуспевать) в чем-л.*	**to do one's best**	*сделать всё от себя зависящее*
to be married to smb.	*быть женатым на ком-л., быть замужем за кем-л.*	**to agree with smb., to smth.**	*соглашаться с кем-л. или с чем-л.*
quite tall	*довольно высокий*	**to prefer**	*предпочитать*
plump	*полный, пухлый*	**to be in poor health**	*болеть*
to get on (with)	*ладить*		

1.3. Read the text.

MY FAMILY

Hello! Let me introduce myself. My name is Alexander, Sasha for short. Alexander is my first name and Sokolov is my surname. I am Russian. I am nineteen. I was born on 5th April in Tomsk, an ancient Siberian town. Now I am a second-year student of Tomsk University of Control Systems and Radioelectronics. In four years' time I will become an engineer.

Now let me describe my appearance. I am quite tall and slim, with dark hair and brown eyes. I love playing the guitar and I think I am good at it. I am not married yet, but I have got a girlfriend. Her name is Irina. She is seventeen and she is a student too. She is not tall, quite fair and very pretty.

Our family is not very large. I have got a father, a mother a sister and a brother. We live in a new four rooms' flat. My father's name is Igor and he is forty-five years old. He is tall and well-built, with short black hair and grey eyes. He works for a computer company as a programmer. He likes his job and spends most of the time there. By character my father is a quiet man, while my mother is energetic and talkative. Her name is Olga. She is short and plump, with curly hair. She is quite good-looking. She is a teacher of music and plays the piano well. My mother always has a lot of work to do about the house and at school. She is a busy woman and we all help her. My elder sister, Anna, is twenty-five years old. She is married. She is a doctor. Her husband, Nikolay, is an electrician. They have got two children: a daughter and a son. Their daughter, Diana, is four and their son, Oleg, is two.

My younger brother's name is Stas. Now he is a student at Moscow State University. He lives in a hostel not far from here. There are three more students in his room: one from Switzerland and two from France. They are from different countries but they get on well together. They study at the same faculty, the faculty of management and finance and have much in common. They are future specialists in the sphere of

business and national economics. Stas is very sporty. He likes swimming a lot so three times a week he goes to the swimming-pool. Steve is a member of the university swimming team and twice a year, in April and October, he takes part in the swimming competitions among the students of different faculties. Stas is a good student. He works hard and does his best to be a good specialist in economics and management.

Our family is very friendly. In the evenings we watch TV, read books and newspapers, listen to music or simply talk about the events of the day. Our parents do not always agree to what we say, but they listen to our opinion. We like spending our weekends out of town. We often go to the village where our grandparents live. They are pensioners now, but prefer to live in the country. My great-grandmother is still alive. She lives with my grandmother's family and is always glad to see us. She is in poor health and asks us to come and see her more often. I have also got a lot of relatives: uncles, aunts and cousins. We are happy when we are together.

1.4. Match the following words and expressions with their Russian equivalents.

1. to play the piano	a) хорошенькая (*только о женщинах*)
2. a second-year student	b) подруга (молодого человека)
3. in four years' time	c) учиться на одном факультете
4. talkative	d) симпатичный (-ая)
5. dark hair	e) карие глаза
6. brown eyes	f) темные волосы
7. a girlfriend	g) старшая сестра
8. pretty	h) разговорчивый, болтливый
9. well-built	i) дважды в год
10. a quiet man	j) поехать в деревню
11. good-looking	k) играть на фортепиано
12. short	l) кудрявые волосы
13. an elder sister	m) прабабушка
14. twice a year	n) студент второго курса
15. to study at the same faculty	o) через четыре года
16. to become an engineer	p) проводить выходные дни за городом
17. to spend weekends out of town	q) стать инженером
18. to go to the village	r) тихий человек
19. a great-grandmother	s) крепкий; хорошо сложённый
20. curly hair	t) невысокого роста

1.5 Answer the questions according to the text.

1. What is Alexander's surname?
2. How old is he?
3. Where and when was he born?
4. What does he do? (What's his job?)
5. Has he got a girlfriend?
6. Is his family large?

7. How many people are there in his family?
8. What's his father like?
9. Is Igor tall or short?
10. Is Olga a busy woman?
11. Has Sasha got any sisters or brothers?
12. Is Anna married or single?
13. Is Stas a good student?
14. Has Alexander got many relatives?
15. Is his family friendly?

1.6. Work in pairs. Ask and answer the following questions, then report your answers to the class.

1. What is your name?
2. Where and when were you born?
3. How old are you?
4. What do you do? (What's your job?)
5. What's your address?
6. What's your phone number?
7. What are you like?
8. Are you married or single?
9. Have you got a large family?
11. Have you got any sisters or brothers?
12. How many relatives have you got? What are their names?

Text B

BILL GATES

Pretext exercises

1.7. Read the words and try to guess their meaning.

Microsoft Corporation, leader, business, realize, potential, regent, interest, programming, mission, computers, chief, version, microcomputer, company, philanthropy, start, philanthropic, initiative, global, commander, Empire, career, position, architect, individual, golf.

1.8. Read the following words and notice their pronunciation.

attorney	[ə`tə:nɪ]	career	[kə`rɪə]
philanthropy	[fɪ`lænθrəpɪ]	overall	[`əuvərɔ:l]
inequity	[ɪ`nekwətɪ]	shareholder	[`ʃɛəhəuldə]
initiative	[ɪ`nɪʃətɪv]	percent	[pə`sent]
bestow	[bɪ`stəu]		

Memorize the following words and expressions

attorney	*поверенный, юрист, адвокат*	**inequity**	*несправедливость*
exclusive	*престижный*	**knighthood**	*рыцарское звание*
upbringing	*воспитание*		
software	*программное обеспечение (ПО), «софт»*	**to bestow**	*награждать*
software architect	*разработчик структуры системы программного обеспечения*	**consistently**	*последовательно, согласованно*
freshman	*студент первого курса (амер.)*	**overall**	*полностью, в (общем и) целом*
to devote (one's) energy	*вкладывать энергию*	**to rank**	*занимать какое-л. место*
cost-effective	*рентабельный*	**shareholder**	*акционер*
foundation	*фонд*		

1.9. Read the text.

BILL GATES

"We've really achieved the ideal of what I wanted Microsoft to become."

Bill Gates, June 2008

William (Bill) H. Gates III is a chairman of Microsoft Corporation, the worldwide leader in software, services that help people and businesses realize their full potential.

Gates was born on October 28, 1955 in Seattle, Washington, the USA. His father, William H. Gates II was a Seattle attorney and his mother, Mary Maxwell Gates was a school teacher, University of Washington regent, and chairwoman of United Way International. Gates and his two sisters attended the exclusive secondary "Lakeside School" and had a comfortable upbringing. There, he discovered his interest in software and began programming computers at age 13.

In 1973, Gates entered Harvard University as a freshman, where he developed a version of the programming language BASIC for the first microcomputer – the MITS Altair.

In his junior year, Gates left Harvard to devote his energies to Microsoft, a company he had begun in 1975 with his childhood friend

Paul Allen. Under Gates' leadership, Microsoft's has continually advanced and improved software technology, and made it easier, more cost-effective and more enjoyable for people using computers.

Philanthropy is very important to Gates. He and his wife, Melinda, started a foundation in 2000 to help reduce inequities in the United States and around the world. The Bill & Melinda Gates Foundation supports philanthropic initiatives in the areas of global health and learning, with the hope that in the 21st century, advances in these areas will be available for all people.

In March 2005, William H. Gates received an "honorary" knighthood from the queen of England. Gates was bestowed with the KBE Order for his services in reducing poverty and improving health in the developing countries of the world.

He is consistently ranked among the world's wealthiest people and was the wealthiest overall from 1995 to 2009, excluding 2008, when he was ranked third, and 2010-2011, when he was ranked second behind Mexico's Carlos Slim Helú. During his career at Microsoft, Gates held the positions of CEO and chief software architect, and remains the largest individual shareholder with more than 8 percent of the common stock. He is also an author and a co-author of several books.

Bill Gates lives near Lake Washington with his wife Melinda French Gates and their three children. Interests of Gates include reading, golf and playing bridge.

Notes to the text

United Way International	*благотворительная общественная организация, занимающаяся сбором средств на оказание гуманитарной помощи*
BASIC	*один из первых простых языков компьютерного программирования*
MITS Altair	*персональный компьютер Altair (фирмы Micro Instrumentation Telemetry Systems, 1975 г.)*
KBE	*Рыцарь-Командор*
CEO	*главный исполнительный директор*

1.10. Answer the following questions according to the text.

1. When and where was William (Bill) H. Gates born?
2. What were his parents?
3. What did Gates develop in 1973?
4. Did he graduate from Harvard University?
5. When was the company Microsoft formed?
6. What initiatives does The Bill & Melinda Gates Foundation support?
7. What year was Bill Gates bestowed with the KBE Order?
8. Which positions did Bill Gates hold during his career at Microsoft?

9. Who is the richest person in the world: William Henry Gates or Carlos Slim Helú?
10. What are the interests of Bill Gates?

 **1.11. Prepare topic "A Famous Person".**

GRAMMAR

Articles a (an) / the, Plurals, Possessive Case

1.12. Complete the following sentences with *a, an, the* or – .

1. I have got … English book.
2. This boy is … student of … group 3.
3. Is Mary from … Manchester or from … London?
4. Come to … blackboard and write … Exercise 2.
5. There is … picture on … page 20.
6. Open … door, please.
7. You have got … mistake in … word "correspondence".
8. … Mississippi is … longest river in … world.
9. What is … capital of … Spain?
10. There were only … two people in … hall.
11. Elbrus is … highest mountain in … Caucasus.
12. Where is … Sahara Desert?

1.13. Write plural form of the following nouns.

A person – … , a businessman – … , a camera … , a life – … , an actress … , a photo – … , a country – … , a child – … , a tooth – … , a goose – … , a foot – … , a fish – …, a camera – … , a policewoman – … , a mouse – … , an aircraft – … , a wife – … , an actress – … , a sheep – … , a tomato – … , a nephew – … .

1.14. Change the following phrases using right possessive forms of the nouns in brackets, as in the model.

Model: the office of Mr. Green - Mr. Green's office

1. the success of my chief; 2. the room of managers; 3. the money of salesmen; 4. the advice of Miss Jane; 5. the proposal of our Director; 6. the phone number of their boss; 7. the opinion of his friends; 8. the fax of businessmen; 9. the problem of experts; 10. the business of Mr. Black.

The verb *to be*

1.15. Make the following sentences negative or interrogative, as in the model.

Model: – **I am** seventeen. (–)
– **I'm not** seventeen.

– **She is** *my* daughter. (?)
– **Is she** *your* daughter?

1. They are married. (–)
2. She is from Spain. (?)
3. I am a driver. (–)
4. Her boyfriend is from Germany. (?)
5. He is a teacher. (–)
6. They are from Australia. (–)
7. It is near the chair. (?)
8. You are Russian. (–)
9. His wife is German. (?)
10. I am a student. (?)
11. He is a pilot. (–)
12. We are from Italy. (?)
13. My name is John Winston. (?)
14. I am seventeen years old. (?)
15. Her name is Julia. (–)

1.16. Complete the dialogue using the cues, as in the model.

Model: – your / name?
– **What's your name?**
– Roberta Stone.

1. you / from / London?	…	– No, I'm from Liverpool.
2. you / English?	…	– Yes, I am.
3. your / job?	…	– I'm an actress.
4. you / married?	…	– No, I'm single.
5. your / address?	…	– 35, South Street.

1.17. Complete the following sentences with the correct form of the verb *to be.*

1. He … a computer programmer.
a) am b) were c) is

2. Her hobby … tennis.
a) are b) were c) is

3. They … active members of our English club last year.
a) will be b) were c) are

4. The weather … nice tomorrow.
a) will be b) is c) was

5. I hope it … cold next Friday.
a) isn't b) wasn't c) won't be

6. He … in Kiev in two days' time.
a) is b) will be c) was

7. '… you at the University yesterday?' 'Yes, I … .'
a) Was; was b) Was; am c) Were; was

8. … you busy now?
a) Is b) Were c) Are

9. What country … you from?
a) are b) was c) is

10. When I … a small child I … very noisy, but now I … not.
a) were, was, am b) was, was, am c) was, was, was

11. Last year we ... at school, next year we ... the second year students.
a) was, are b) were, are c) were, will be

12. Moscow ... the capital of Russia.
a) was b) are c) is

1.18. Translate the following sentences into English.

1. Моя сестра – учительница.
2. Завтра я буду занят.
3. Где вы были вчера?
4. Она замужем.
5. Они из Лондона? – Нет, они из Оксфорда.
6. Когда она была молодой, она была очень хорошенькой.
7. Вы программист?
8. Джону десять лет.
9. Ее муж не итальянец, он немец.
10. Из какой вы страны?
11. Он был в университете вчера? – Нет, он был дома.
12. Я надеюсь, ты будешь свободен в следующую субботу.

The verb *to have (got)*

1.19. Complete the following sentences with the correct form of the verb *to have* (*got*).

1. My husband and I … sometimes … a lot of problems.
2. When I was younger, I … a lot of friends, but now I … any.
3. I think we … a new house next year.
4. They … a son and two daughters.

5. He … enough money five years ago, but now he … much.
6. When he was seventeen, he … a motorbike, but now he … an expensive car.
7. I am sure I … a modern computer in three years' time.
8. Our library ... a great number of books and magazines.
9. They ... industrial training in a month.
10. My brother … a good sense of humour.

1.20. Translate the following sentences into English.

1. Я уверен, что через два года у меня будет новый дом.
2. У нас много проблем.
3. Когда Питер был молодым, у него были темные волосы.
5. У тебя есть собака? – Нет, у меня кошка.
4. У него есть компьютер? – Да.
5. Я надеюсь, что в следующем месяце у меня будет хорошая работа.
6. У моего дяди есть новый автомобиль.

Unit 2. THE VALUE OF EDUCATION

Text A *Higher Education in Russia*
Text B *Tomsk State University of Control Systems and Radioelectronics*

Grammar: **Present Simple, Present Progressive, Future Simple, Past Simple, Present Perfect**

Text A

HIGHER EDUCATION IN RUSSIA

Pretext exercises

2.1. Read the following words (expressions) and try to guess their meaning.

History, Russia, University, initiative, plan, revolution, to guarantee, Soviet, Constitution, examination, grant, result, the Russian Federation, democratic state, start, democratic reform, sphere, system, school, colleague, lyceum, gymnasium, mechanism, social, speciality, faculty, innovative business ideas and theories, region, nation, prestigious, specialist, person, baccalaureate, magistrate.

2.2. Read the following words and notice their pronunciation.

knowledge	[`nɔlɪʤ]	generation	[ˌʤenə`reɪʃən]
accordance	[ə`kɔːdəns]	importance	[ɪm`pɔːtəns]
speciality	[speʃɪ`ælɪtɪ]	sphere	[sfɪə]
examination	[ɪgˌzæmɪ`neɪʃn]	opportunity	[ˌɔpə`tjuːnətɪ]
foreign	[`fɔrɪn]	initiative	[ɪ`nɪʃətɪv]
powerful	[`pauəful]	entrance	[`entrəns]
prestigious	[pres`tɪʤəs]	guarantee	[ˌgærən`tiː]
colleague	[`kɔliːg]	lyceum	[laɪ`siːəm]
Region	[`riːʤn]	theory	[`θɪərɪ]
baccalaureate	[bækə`lɔrɪət]B	magistrate	[`mæʤɪstrət]

Memorize the following words and expressions

higher education	*высшее образование*	**aim**	*цель*
on the initiative of smb.	*по инициативе кого-л.*	**humanities**	*гуманитарные предметы*

in accordance with smth.	*в соответствии с чем-л., согласно чему-л.*	**powerful**	*значительный, сильный, мощный*
secondary education	*среднее образование*	**social development**	*общественное развитие*
to pass entrance examinations	*сдать вступительные экзамены*	**school leaver**	*выпускник школы*
educational establishment	*образовательное учреждение*	**to enter the university**	*поступить в университет*
monthly grant	*ежемесячная стипендия*	**wide choice of smth.**	*большой выбор чего-либо*
to fail (in) an examination	*не выдержать экзамен*	**to graduate from the university**	*закончить университет*
to take place	*происходить, случаться, иметь место*	**well-paid job**	*хорошо оплачиваемая работа*

2.3. Read the text.

HIGHER EDUCATION IN RUSSIA

"Education is the passport to the future, for tomorrow belongs to those who prepare for it today".

(Malkom X.)

The history of higher education in Russia goes back to 1755 when the first University was founded on the initiative of M.V. Lomonosov and in accordance with his plan. Later, universities were opened in many other big cities of the country. After the revolution in 1917, education was guaranteed to Soviet citizens by the Constitution and was free of charge. Higher education was not the exception. Those who got the secondary education and passed entrance examinations to higher educational establishments received monthly grants if they had good results during the term and did not fail the examination at the end of each term. Course of study lasted five years.

In 1991, the Russian Federation, one of the biggest and the most powerful countries in the world, began to be developed as a democratic state. From the very start democratic reforms began to take place in many spheres of life as well as in the system of higher education. Its aim was to prepare the younger generation for independent life and work in new conditions. There have appeared a lot of private

schools, colleges, lyceums, gymnasiums and different courses where students can study sciences and humanities as well as foreign languages.

Since the year 2010 the system of higher education in Russia has been greatly changing into the two-level one: the Baccalaureate (undergraduate studies) and the Magistrate (MA course).

Higher education in Russia is becoming a powerful mechanism for the social development of the country. The level of higher education has greatly changed. Nowadays school leavers have opportunities to enter any university in the city where they live as well as in any other cities in accordance with their future speciality. Universities offer the high level of knowledge and have a wide choice of departments and faculties. The universities provide the faculties for innovative business ideas and theories that shape the fortunes of cities, regions and even nations. It is becoming prestigious and important to graduate from the university and get a well-paid job both in Russia and in other countries of the world.

Higher education is of great importance not only in Russia but also all over the world and you have to do your best to be a good specialist and to follow the conditions and requirements of modern life. Nowadays a bright future of any person depends on higher education.

2.4. Read the statements and decide if they are true (T) or false (F).

1. The first University in Russia was founded in accordance with the plan of M.V. Lomonosov.
2. It was guaranteed by the Constitution that any Soviet citizen could get higher education.
3. It was not necessary to have secondary education to become a university student.
4. The government of the Russian Federation started the reforms in the system of higher education in 1991.
5. Working in new conditions was one of the aims of reforming the system of higher education.
6. In accordance with the reforms everybody had to attend private schools.
7. The social development of the country depends on the level of higher education.
8. Nowadays the system of higher education in Russia is becoming a two-level one.
9. It doesn’t matter for the fortunes of cities if you have any education or not.
10. The Russian Federation is a country that provides young people with the opportunity of getting higher education.

2.5. Match the following words and expressions with their equivalents.

1. to graduate from the state university	a) иностранный язык
2. to find a well-paid job	b) получать стипендию
3. powerful energy	c) уехать из страны
4. the aim of my life	d) замечательные возможности
5. to enter the medical university	e) молодое поколение
6. a foreign language	f) закончить государственный университет
7. to receive a grant	g) в соответствии с программой
8. excellent opportunities	h) в течение семестра
9. to leave the country	i) большой выбор специальностей
10. to pass entrance examinations	j) поступить в медицинский университет
11. during the term	k) цель моей жизни
12. young generation	l) найти хорошо оплачиваемую работу
13. in accordance with the program	m) так же, как
14. a wide choice of specialties	n) по инициативе преподавателя
15. high level of knowledge	o) мощная энергия
16. to fail the examination in Physics	p) иметь большое значение
17. as well as	q) с самого начала
18. on the initiative of the teacher	r) не выдержать экзамен по физике
19. from the very start	s) высокий уровень знаний
20. to be of great importance	t) сдать вступительные экзамены

2.6. Complete the following sentences with the expressions from the box.

of great importance find a well-paid job fail the exams
in accordance with the plan a wide choice of specialities
educational establishments a high level of knowledge
excellent opportunities foreign languages entrance examinations

1. It doesn't matter where you live, but higher education is … everywhere.
2. At universities and colleges students get … and become good specialists in all the spheres of science and technology.
3. School leavers have … to enter the universities all over the country.
4. There are three … you have to pass. They are Physics, Mathematics and English.
5. There are a lot of … in Moscow but the State University is the most famous among them.
6. The students have several special subjects … .

7. Our university offers … . You may choose computer science, control systems, radioengineering, radioelectronics, *etc.*
8. There are a lot of vacancies but there is always a problem to … .
9. If you can't speak any … especially English, you will have some serious difficulties to get further education abroad.
10. You have to work hard and not to … if you want to get a monthly grant.

2.7. Choose ten of the expressions from exercise 2.5. and write sentences of your own.

Text B

TOMSK STATE UNIVERSITY OF CONTROL SYSTEMS AND RADIOELECTRONICS

Pretext exercises

2.8. Read the following words and expressions and try to guess their meaning.

Faculty, examination, computer, design, cooperate, speciality, distant, department, opportunity, radioelectronics, telecommunication, system, control, industrial, direction, radioengineering, modern, firm, company, professional, international, engineer, direction, construction, production.

2.9. Read the following words and notice their pronunciation.

higher	[`haɪə]	equip	[ɪ`kwɪp]
establishment	[ɪs`tæblɪʃmənt]	automated	[ˌɔ:tə`meɪtɪd]
educational	[ˌedju`keɪʃnl]	device	[dɪ`vaɪs]
department	[dɪ`pɑ:tmənt]	qualified	[`kwɔlɪfaɪd]
engineer	[ˌendʒɪ`nɪə]	scientific	[ˌsaɪən`tɪfɪk]
enterprise	[`entəpraɪz]	society	[sə`saɪətɪ]
direction	[dɪ`rekʃn]		

Memorize the following words and expressions

to found	*основывать*	**direction of development**	*направление развития*
correspondence department	*заочное отделение*	**exchange of smb. (smth.)**	*обмен чем-либо, кем-либо*
distant education	*дистанционное образование*	**leading university**	*ведущий университет*
modern device	*современное устройство*	**to be trained in speciality**	*обучаться (по) специальности*

to give an opportunity	*предоставлять возможность*	**automated control systems**	*системы автоматизированного управления*
native town	*родной город*	**computer-aided design systems**	*системы автоматизированного проектирования*
to be equipped with smth.	*быть оснащенным (оборудованным) чем-либо*	**scientific society**	*научное общество (объединение)*
highly qualified	*высококвалифицированный*	**to be engaged in smth.**	*быть вовлеченным во что-либо или занятым чем-либо*
in the field of smth.	*в области чего-либо*	**international enterprise**	*международное предприятие (организация, фирма)*
to win a contest	*выиграть конкурс*	**sport facilities**	*спортивные сооружения*
since then	*с того момента (с тех пор)*	**Leisure Center**	*Центр досуга (центр внеучебной работы)*
to carry out	*выполнять (осуществлять)*	**high-quality training**	*высококачественное обучение*
research field	*сфера исследования*	**in order to**	*для того чтобы*

2.10. Read the text.

TOMSK STATE UNIVERSITY OF CONTROL SYSTEMS AND RADIOELECTRONICS

Tomsk State University of Control Systems and Radioelectronics was founded in 1962.

At the present time TUCSR is one of the leading higher educational establishments in Russia. The university has three departments: a day-time department, an evening (part-time) and a correspondence ones. In 1998, the Center of Distant Education was founded which is one of the biggest ones and equipped with the most modern computers and other devices. It gives the opportunity to get higher education without leaving native towns and cities for more than 8,000 students all over Russia.

There are nine faculties at the day-time department: the Radio-Design, Radio-Engineering, Electronic Engineering, Computer Systems, Automated Control Systems, Economic, Humanitarian, Law and the Innovation ones. The university is staffed with highly qualified teachers. Many of them are Doctors of Science. The teachers of the university train specialists and engineers in 54 specialities in the field

of radioengineering, programming, information security, radioelectronics, automated control systems, information technologies, economics and social work.

In 2006, TUCSR won the contest among the universities of higher professional education in accordance with the national project "Education" and since then the innovative program has been carried out in scientific and research fields of TUCSR.

One of the directions in scientific and research development is the exchange of students and cooperation with the leading universities of the USA, Germany, France, the Netherlands and Great Britain.

The students of the university are trained in the following specialities: construction and production of radio devices, radioengineering, radioelectronic devices, industrial electronics, physical electronics, automated control systems, computer-aided design systems, social work and management. There are also scientific students' societies where students are engaged in independent research work and design. The specialists who graduate from TUCSR are demanded in different international enterprises, firms and companies.

The university has modern sport facilities such as a sport gym, football pitch, fitness center and others. The students can do any sports they like: playing volleyball, basketball, football, tennis, and chess. They can also do rowing, judo, boxing and aerobics as well as going skiing and swimming. At the University Leisure Center students can take up ball and modern dancing, solo and group singing, writing poems, playing and writing music.

Tomsk State University of Control Systems and Radioelectronics has been developing rapidly. The students of the university have all the opportunities for high-quality training and they do their best in order to become good specialists.

2.11. Answer the following questions.

1. When was TUCSR founded?
2. How many departments are there in TUCSR?
3. When was the Center of Distant Education founded?
4. What specialities are the students of the university trained in?
5. When did the university win the contest in accordance with the national program "Education"?
6. How many faculties are there at the university? Give their names.
7. What faculty do you study at?
8. What is your future speciality?
9. Universities of what countries does TUCSR cooperate with?
10. How many students are there in the Center of Distant Education?
11. What sports are popular in TUCSR?
12. What can students do in their free time?

2.12. Imagine you are talking to a foreign student. What would you tell him about the university you are studying at?

GRAMMAR

Present Simple – Present Progressive

2.13. Choose the correct variant.

1. We often *borrow / are borrowing* English films from the video club.
2. 'What's that music?' 'My brother *listen / is listening* to his new CD of gothic music.'
3. British people *are eating / eat* a lot of Indian food.
4. Don't make noise. My room-mates *sleep / are sleeping* after a hard day at the university.
5. 'Is John in?' – 'No, he isn't. He *is helping / helps* in the Greenfield café. He usually *works / is working* there in summer.'
6. *Do you wear / Are you wearing* a uniform at your school?
7. Mary *isn't playing / doesn't play* tennis very well today.
8. Look at Alex in this photo. He *wears / is wearing* a very smart suit.
9. I don't need an umbrella. It *doesn't rain / isn't raining* at the moment.
10. A lot of British students *go / are going* to Spain on holidays.

2.14. Complete the following sentences with the present simple or present progressive form of the verb, as in the model.

Model: – Martin … (*not / usually / drive*) to work.
– Martin **does not usually drive** to work.

– I … (*have / lunch***)** with my parents at the moment.
– I **am having lunch** with my parents at the moment.

1. 'Where is Andrew?' 'I … (*not / know*).'
2. Sally is tired. She … (*want*) to go home now.
3. What time … (*you / do*) your homework?
4. Mark … (*prepare*) for Physics test in the laboratory at the moment.
5. 'What's the weather like today?' 'It … (*snow*) again.'
6. Look! Those people … (*speak*) French. They are probably from France.
7. How often … (*you / read*) fashion magazines?
8. What is funny? What … (*they / laugh*) at?
9. Rick is a good student. Every Saturday he … (*go*) to the library.
10. 'What game … (*those students / play*)?' 'They are playing baseball.'

2.15. Read the following sentences and decide if the verb refers to the present or the future.

1. I **am leaving** tomorrow to spend Christmas with Mary's family.

2. The doctor **is feeling** her pulse.
3. We **are having** a party next Saturday. Would you like to come?
4. Listen! Ann **is singing** in the next room.
5. Kate, we **are going** to the town center. Are you coming with us?
6. I**'m not going** away for my holidays next month because I haven't got enough money.
7. 'What **are** you **doing**?' 'I **am writing** a letter to my sister.'
8. Look! The bus **is coming**.
9. 'Where are Jack and Sally?' – 'I don't know. I think they **are buying** a new house.'
10. 'When **are** you **meeting** your parents?' – 'They **are coming** tomorrow morning.'

Future Simple

2.16. Choose the correct variant.

1. If Mark … the boat, we … fishing.
   a) repair; will go b) will repair; go c) repairs; will go
2. When you … home, I … you the letter.
   a) come; will read b) comes; will read c) will come; read
3. If she … me, I … her the news.
   a) will call; tell b) calls; will tell c) will call; will tell
4. When Barbara … the door, we … Happy Birthday.
   a) open; will sing b) will open; sing c) opens; will sing
5. Don't hurry him now, he … up as soon as he … ready.
   a) will get; is b) gets; will be c) get; will be
6. Don't go out yet. Wait until the rain … .
   a) will stop b) stop c) stops

Past Simple

2.17. Complete the following sentences with the past simple form of the verb, as in the model.

Model : – Thomas … a new computer two days ago. (*buy*)
– Thomas **bought** a new computer two days ago.

1. I … an e-mail to Mary and she … me back immediately. (*send; write*)
2. Last summer Terry … to France. (*travel*)
3. My father … the university twenty years ago. (*graduate from*)
4. I always drive to work but yesterday I … a bus. (*take*)
5. We … a great show last night. (*see*)
6. Henry … late yesterday so he … Geometry. (*be; miss*)
7. Yesterday Sue … a package from Tom. (*receive*)
8. Three years ago I … swimming with my friends. (*go*)

9. When I … in Italy, I … in a luxury hotel. (*be; stay*)
10. Kelly … her project a week ago. (*finish*)

2.18. Make the following sentences negative, as in the model.

Model: – She **answered** the first question. (*the second question*)
– She **didn't answer** the second question.

1. Peter **had** dinner with Dorothy. (*Fiona*)
2. We **knew** her address. (*phone number*)
3. I **bought** some flowers. (*chocolates*)
4. They **spoke** Spanish. (*English*)
5. Lora **wrote** a letter to Jeremy. (*Chris*)
6. Fred **felt** well last night. (*yesterday morning*)
7. Our group **travelled** to London. (*Oxford*)
8. I **visited** my parents on Friday. (*on Sunday*)
9. You **saw** Mr. Little at the university. (*Mrs. Swanack*)
10. Jack **sent** an e-mail to his brother. (*sister*)

2.19. Write the correct question for the following sentences, as in the model.

Model: – I watched **TV** last night. *(When)*
– **When did** you **watch** TV?

1. Joe went to bed **at 10.30** yesterday evening . *(When*)
2. I had a nice holiday **in Rome**. (*Where*)
3. Susan bought **a fashion magazine** yesterday. (*What*)
4. **It wasn't warm in the room** so the teacher closed the window. (*Why*)
5. Helen received **grant** for her research work two weeks ago. (*What*)
6. Lora played tennis **with her group-mates** an hour ago. (*Who*)
7. I took a shower **because the weather was hot**. (*Why*)
8. The computer cost **two thousand dollars**. (*How much*)
9. The lecture began **at 9.00** o'clock yesterday. (*When*)
10. She took **an interesting book** from the library. (*What*)

Present Perfect

2.20. Complete the following sentences with the present perfect form of the verb, as in the model.

Model: – I … this film twice this month. (*see*)
– I **have seen** this film twice this month.

1. I … Professor McKinley but I … a lot of him. (*not meet; hear*)
2. 'Do your parents know what university you are going to enter?' 'Yes, I … them.' (*tell*)

3. Steve is taking part in the conference next week. He … a very interesting report. (*prepare*)
4. Mary likes this film very much. She … it twice this month. (*see*)
5. Look! Somebody … the books in the room. (*leave*)
6. Bill is on holiday. He … to Italy with his family. (*go*)
7. I … to her three times this week but I … the answer yet. (*e-mail; not receive*)
8. Henry … a great success in the sphere of telecommunications. (*achieve*)
9. 'Can I have this newspaper?' 'Yes, of course. I … it.' (*read*)
10. Since 1998 our company … a lot of progress, so we have no problems with the clients. (*make*)

Past Simple – Present Perfect

2.21. Choose the correct variant.

1. *Have you seen / Did you see* Sally at the party?
2. We *spent / have spent* a month in Paris two years ago.
3. My favorite book is 'War and Peace'. I *read / have read* it three times.
4. *Have you read / Did you read* my report yet?
5. Sarah *came / has come* from work half an hour ago.
6. Ann graduated from the law school in 2005 but she *hasn't worked / didn't work* as a lawyer yet.
7. James has been writing books since 1995 and so far he *has published / published* three books so far.
8. When I was younger, I *didn't know / haven't known* how to use a computer.
9. *Has Andrew ever thought* / *Did Andrew ever think* about changing his job?
10. Henry is proud because he *has passed / passed* the exam.

Revising Tenses

2.22. Choose the right variant and complete the following sentences.

1. My friend … the university last year.
   a) have entered b) entered c) has entered
2. A programmer … instructions and data to the computer.
   a) give b) giving c) gives
3. I …this question over when I … him.
   a) will talk; meet b) will talk; met c) will talk; will meet
4. I … already … my report.
   a) had made b) has made c) have made
5. 'Have you done your homework yet?' 'No, I … it now.'
   a) do b) doing c) am doing

6. I … my Diploma Project now.
   a) write b) wrote c) am writing

7. As a rule he … tests well.
   a) is writing b) write c) writes

8. I can't go out because I … the experiment.
   a) haven't finished b) hadn't finished c) didn't finish

2.23. Read and translate the following sentences paying attention to the tenses.

1. The students of our group **will meet** in the laboratory.
2. The monitor **told** the first-year students to come to the laboratory.
3. He **doesn't understand** this grammar rule.
4. He **has not made** any mistakes.
5. Tomorrow our teacher **will give** us a new task.
6. Students **watched** the process with great attention.
7. At present mankind **is making** considerable investments to eliminate air pollution.
8. The dean **will send** the students to a big plant in summer.
9. He **taught** us to use the lab equipment.
10. **Do** you **know** the answer to this question?
11. Practice **accompanies** theory.
12. **Did** the librarian **give** you all the necessary books?

Unit 3. THE RUSSIAN FEDERATION

Text A	***The Russian Federation***
Text B	***Tomsk***
Grammar:	**present simple passive, past simple passive**

Text A

THE RUSSIAN FEDERATION

Pretext exercises

3.1. Read the following words and expressions and try to guess their meaning.

Russian Federation, million, kilometers, Europe, Asia, the Atlantic ocean, territory, the Altai, the Urals, the Caucasus, the Volga, the Ob, the Yenisei, the Lena, steppe, taiga, tundra, the Baikal, climate, arctic, continental, subtropical, mineral resources, gas, constitutional republic, the President, political system, the Federal Assembly, the Duma, the Speaker, the Prime Minister, system, constitutional, federal, Moscow, political center, national symbols, international cooperation, nation.

3.2. Read the following words and notice their pronunciation.

surface	[`sə:fis]	constitutional	[ˌkɔnstɪ`tju:ʃənəl]
situate	[`sɪtjueɪt]	legislative	[`leʤɪslətɪv]
eastern	[`i:stən]	executive	[ig`zekjutɪv]
northern	[`nɔ:ðən]	government	[`gʌvənmənt]
ocean	[`əuʃən]	judicial	[ʤu:`dɪʃəl]
south	[sauθ]	court	[kɔ:t]
mountain	[`mauntɪn]	comprise	[kəm`praɪz]
numerous	[`nju:mərəs]	supreme	[su:`pri:m]
highland	[`haɪlənd]	assembly	[ə'semblɪ]
influence	[`ɪnfluəns]	scientific	[ˌsaɪən`tɪfɪk]
resource	[rɪ`zɔ:s, rɪ`sɔ:s]	official	[ə`fɪʃəl]
ore	[ɔ:]	symbol	[`sɪmbəl]

Memorize the following words and expressions

a total area	*общая площадь*	**to head**	*возглавлять*
to occupy	*охватывать, занимать*	**a legislative power**	*законодательная власть*

to border on	*граничить с*	**the Upper House**	*верхняя палата*
vast	*обширный, огромный,*	**the Lower House**	*нижняя палата*
a plain	*равнина*	**a Federation Council**	*совет федерации*
numerous	*многочисленный*	**an executive power**	*исполнительная власть*
different (from)	*различный, разный, отличный (от)*	**a judicial power**	*законодательная власть*
moderate climate	*умеренный климат*	**the Constitutional Court**	*конституционный суд*
to influence smth.	*оказывать влияние, влиять*	**the Supreme Court**	*верховный суд*
to be rich in smth.	*быть богатым чем-л.*	**a Federal Assembly**	*федеральное собрание*
mineral resources	*минеральные ресурсы*	**an official language**	*официальный язык*
especially	*особенно, главным образом*	**a banner**	*знамя*

3.3. Read the text.

THE RUSSIAN FEDERATION

The Russian Federation is the largest country in the world. Its total area is over 17 million square kilometers and it occupies about 1/6 of the Earth surface. The population of Russia is about 150 million people. The country is situated in Eastern Europe, Northern and Central Asia. The land is washed by 12 seas, most of which are the seas of three oceans: the Arctic, the Atlantic and the Pacific one. In the south and in the west the country borders on fourteen countries. The great part of the territory of Russia is vast plains with high mountains and long rivers. The highest mountains of our land are the Altai, the Urals and the Caucasus. The Volga and the Ural are the longest rivers in the European part of the country. The longest rivers in the Asian part are the Ob, the Yenisei and the Lena. Russia has also got numerous forests and steppes, taiga and tundra, highlands and deserts. The country is rich in various lakes, the deepest of which is the Baikal.

As Russia is a very large country, the climate conditions are rather different: from arctic and moderate to continental and subtropical. The Arctic Ocean influences the weather on a great territory of the country. In some parts of the country winter lasts as long as six months. The Russian Federation is one of the richest in mineral resources

countries in the world especially in natural gas, oil, coal, different ores, ferrous and non-ferrous metals.

The Russian Federation is a constitutional republic headed by the President. The political system consists of three branches of power:

– the legislative branch which consists of the Federal Assembly that is divided into two houses – the Upper House, that is the Federation Council, and the Lower House, the Duma. Each house is headed by the Speaker.

– the executive branch is the government with the Prime Minister at the head.

– the judicial branch which consists of the system of Courts comprising the Constitutional Court, the Supreme Court and federal courts.

The President controls only the executive branch – the government, but not the Supreme Court and Federal Assembly.

The capital of Russia is Moscow, the largest political, scientific, cultural and industrial center as well as one of the most beautiful cities of the world. Russian is the official language of the state. The national symbols of the Russian Federation are a white-blue-red banner and a double-headed eagle.

The foreign policy of Russia is that of international cooperation, peace and friendship with all nations and countries.

3.4. Complete the following sentences with the expressions from the box.

total area	**borders on**	**is rich in**	**consists of**	**is washed by**
international cooperation		**the official language**		**is situated**
is headed by	**a constitutional republic**		**cultural and industrial center**	

1. France … … Germany and Denmark.
2. The Russian Federation is … … … and it … … … the President.
3. They speak Spanish in Brazil. It's … … … of the country.
4. Canada is a very big country. Its … … is about eleven million square kilometers.
5. The western part of the country … … numerous plains and forests.
6. Brazil … … … oil, gas and coal.
7. The island … … … the Pacific Ocean.
8. The House of Parliament … … in the center of London.
9. My native town is a … … … … of Siberia.
10. The most important direction of the foreign policy is that of … … .

3.5. Answer the following questions.

1. What is the total area of the Russian Federation?
2. How many countries does Russia border on?
3. What climate conditions are there in Russia?
4. What lake is the deepest in Russia?

5. Can you name the longest rivers of the country?
6. Who (What) is the Russian Federation headed by?
7. Which mineral resources is Russia rich in?
8. How many branches of power does the country consist of?
9. What are the national symbols of the Russian Federation?
10. What are the main directions of the international cooperation of Russia with other countries and nations?

Text B

TOMSK

Pretext exercises

3.7. Read the words and expressions and try to guess their meaning.

Siberian town, tsar, commercial centre, gubernia, administrative center, intensive, history, medicine, Technological Institute, Asian, Polytechnical University, pedagogical, medical, institute, revolution, territory, center, the Urals, college, architecture, academy, cultural centre, Drama Theatre, concert, monument, memorial.

3.8. Read the following words and notice their pronunciation.

Siberian	[saɪ`bɪərɪən]	situate	[`sɪtjueɪt]
commercial	[kə`mə:ʃəl]	emperor	[`empərə]
cereal	[`sɪərɪəl]	medicine	[`medɪsɪn]
Asian	[`eɪʃən]		

Memorize the following words and expressions

to be situated	*быть расположенным*	**booming**	*процветающий*
to be founded	*быть основанным*	**mining**	*добыча, добывание*
cereals	*зерновые культуры*	**to be engaged in**	*заниматься*
wax	*воск*		

3.9. Read the text.

TOMSK

Tomsk is an old Siberian town which is situated on the bank of the river Tom, in West Siberia. Tomsk was founded in 1604 by Tsar Boris Godunov. At the beginning of the 18th century, Tomsk became a commercial centre of Siberia. It supplied cereals, fish, salt, wine, fat, copper, wax and leather to the

neighbor gubernias. In 1804, Tomsk became an administrative center of the Gubernia. The growth of the town was especially booming in the 30s of the 19th century when gold was found and its intensive mining started in the Tomsk Gubernia. In 1888, Emperor Alexander III opened the first University in Siberia. In its early history the University had only the department of medicine. The year 1900 saw the opening of the first Technological Institute in the Asian part of Russia (now the Polytechnical University). And a few years later the Pedagogical, Medical and Civil Engineering Institutes were founded.

After the revolution of 1917, Tomsk became the part of the Siberian Territory and later of the West-Siberian Territory.

Tomsk is one of the biggest educational and scientific centers in Russia to the east of the Urals. About 60,000 students (local residents and newcomers from different parts of Russia) study at technical schools, colleges and universities. There are more than 9 higher educational establishments in Tomsk. The most prominent of them are State University, Polytechnical University, Siberian Medical University, Teachers' Training University, University of Control Systems and Radioelectronics, University of Architecture and Civil Engineering and Agricultural Academy. About 50 scientific institutions are engaged in research work; more than 15 of them are part of the universities.

Now Tomsk is known as a cultural centre of Siberia. There are several theatres, such as the Drama Theatre, "Intim" Theatre, Puppet Theatre, Young Spectators' Theatre, concert halls and museums. Tomsk is proud of its wooden architecture. There are also a lot of monuments to some famous people. The memorial of Glory devoted to the people who perished during the Great Patriotic War is situated in Lagerny Garden.

Tomsk has been changing a lot recently. The authorities of the town are trying to do their best to make it more beautiful and modern.

3.10. Read the statements and decide if they are true (T) or false (F).

1. Tomsk is an old Siberian town which is situated on the bank of the river Tom, in East Siberia.
2. Tomsk was founded at the beginning of the 16th century.
3. In 1804, Tomsk became an administrative center of Russia.
4. The first University in Tomsk was founded in 1888.
5. After the revolution of 1917, Tomsk became the part of the Novosibirsk Oblast.
6. Tomsk is the oldest educational and scientific center in Russia to the east of the Urals.
7. More than 60,000 students study at technical schools, colleges and universities.
8. The most prominent of higher educational establishments are State University, Polytechnical University, Siberian Medical University, Teachers' Training

University, University of Control Systems and Radioelectronics, University of Architecture and Civil Engineering as well as Agricultural Academy.

9. There are sixty scientific institutions in Tomsk.
10. Now Tomsk is known as a cultural centre of Siberia.

3.11. Answer the following questions.

1. When was Tomsk founded?
2. Where is Tomsk situated?
3. Who opened the first university in Siberia?
4. Which department was the first at Tomsk University?
5. Why was the growth of the town especially booming in the 30s of the 19th century?
6. How many higher educational establishments are there in Tomsk?
7. What are the most prominent universities in Tomsk?
8. Why is Tomsk known as a cultural centre of Siberia?
9. Is Tomsk a town of science? Why? Why not?
10. Do you like Tomsk? Why/ Why not?

3.12. Tell the partner about your native town.

GRAMMAR

Present Simple Passive – Past Simple Passive

3.13. Complete the following sentences. Use the correct passive Present Simple or Past Simple form of the verb.

Model: The computer **was repaired** last week. (*repair*)

1. French … … in France and Canada. (*speak*)
2. Philosophy … … on the first course in most universities of Russia. (*study*)
3. Tomsk … … in the south-west of Siberia. (*situate*)
4. TUCSR … … in 1962. (*found*)
5. The boutique ‘Fashion Show’ … … five years ago. (*open*)
6. The Russian President … … every four years. (*elect*)
7. Paper … … by the Chinese. (*invent*)
8. The new laboratory … … with modern computers. (*equip*)
9. ‘Eugenie Onegin’ … … by A. Pushkin. (*write*)
10. The modern museum … … last year. (*build*)

3.14. Rewrite the following sentences in passive, as in the model.

Model: – They **play** football in many countries.
– Football **is played** in many countries.

– The Europeans **discovered** Australia in the 17th century.
– Australia **was discovered** by the Europeans in the 17th century.

1. My mother usually **wakes** me **up** at 7 o'clock.
2. They **grow** rice in Vietnam.
3. The reporter **wrote** a very interesting article.
4. Millions of tourists **visit** Moscow every year.
5. We **took** a lot of photographs when we went to Italy.
6. They **built** the Central museum in 1928.
7. Somebody **left** the books on the table.
8. The manager **asked** me a lot of questions yesterday.
9. They **show** American programs on British television.
10. The Italians **make** Italian ice-cream with coconut milk.

3.15. Write the questions for the sentences. Use the passive form.

Model: 'Fiat' was started **in 1899**. (***When***)
When was 'Fiat' started?

1. The agreement was signed **in the White House**. (***Where***)
2. The flowers are delivered **every day** by the flower company. (***How often***)
3. Our office was painted in **grey and white**. (***What colors***)
4. 'Yesterday' was written by **John Lennon and Paul McCartney**. (***Who***)
5. The first university in Tomsk was founded in **1888**. (***When***)
6. **Thirty-five** books were written by my father. (***How many***)
7. Macdonald's hamburgers are sold **in many countries**. (***Where***)
8. The bill for electricity was paid **last week**. (***When***)
9. **The Day of St. Valentine** is celebrated on 14th February. (***What holiday***)
10. The Olympic Games are held **every four years**. (***How often***)

3.16. Choose the correct variant.

1. Millions of cars … from Japan every year.
   a. are exported b. export c. exported
2. When … the radio invented?
   a. was b. is c. did
3. The post … twice a day.
   a. were delivered b. is delivered c. delivered
4. How many languages … in Canada?
   a. is spoken b. was spoken c. are spoken
5. A lot of mistakes … in the text.
   a. were made b. is made c. made

6. Hockey … in winter.
   a. were played b. is played c. are played
7. Glass … from sand.
   a. makes b. made c. is made
8. This room …last month.
   a. is painted b. was painted c. painted
9. A lot of houses … in our town every year.
   a. were built b. are built c. built
10. Coffee … from Brazil.
   a. imported b. were imported c. is imported
11. The bills … at the end of this week.
   a. were paid b. will be paid c. is paid

Unit 4. THE UNITED KINGDOM

Text A	***The United Kingdom***
Text B	***Higher Education in Great Britain***
Grammar:	**revising verbals**

Text A

THE UNITED KINGDOM

Pretext exercises

4.1. Read the following words and expressions and try to guess their meaning.

United, total, leader, population, capital, major, command, business, commerce, principle, focus, liberalization, regulation, economy, concentrate, industry, international, global, calendar, production, textile, private, public, product, constitutional, monarchy, parliamentary, cultural, military.

4.2. Read the following words and notice their pronunciation.

kingdom	[`kɪŋdəm]	originate	[ə`rɪʤɪˌneɪt]
square	[skwɛə]	success	[sək`ses]
constituent	[kən`stɪtjuənt]	renown	[rɪ`naun]
business	[`bɪznəs]	influence	[`ɪnfluəns]
majority	[mə`ʤɔrətɪ]	privately	[`praɪvɪtlɪ]
shipbuilding	[`ʃɪpˌbɪldɪŋ]	parliamentary	[ˌpɑːlə`mentərɪ]
monarchy	[`mɔnəkɪ]	government	[`gave(n)mənt]
textile	[`tekstaɪl]	Birmingham	[`bəːmɪŋəm]
Edinburgh	[`edɪnbərə]	Wimbledon	[`wɪmbldəm]

Memorize the following words and expressions

total area	*общая площадь*	**rowing**	*гребля*
a major center	*важный (главный, крупный) центр*	**to retain**	*удерживать, сохранять*
constituent	*составляющий часть (целого)*	**to influence**	*влиять, оказывать влияние*

to include	*включать, содержать в себе*	**steel production**	*производство стали*
taxation	*обложение налогом, взимание налога*	**be ranked as smth.**	*котироваться (расцениваться) как что-либо (в качестве чего-либо)*
initially	*первоначально, в исходном положении*	**privately**	*частным образом*
shipbuilding	*кораблестроение*	**vast majority**	*значительное большинство*
coal mining	*добыча угля*	**internationally renowned**	*известный (знаменитый, прославленный) во всем мире*
a tourist destination	*достопримечатель-ность*	**to originate from smth.**	*происходить, возникать из (от) чего-либо*

4.3. Read the text.

THE UNITED KINGDOM

The United Kingdom is situated in the north-west of Europe. It consists of four countries: Great Britain, Scotland, Northern Ireland and Wales. The total area of the United Kingdom is 242,000 square kilometers. The population of the United Kingdom is more than 60 million people. The four capitals of the United Kingdom's constituent countries are London (England), Edinburgh (Scotland), Cardiff (Wales) and Belfast (Northern Ireland).

The Anglo-Saxon model focuses on the principles of liberalization, the free market, and low taxation and regulation. The United Kingdom is the fifth largest economy in the world and the second largest in Europe after Germany. The British started the Industrial Revolution initially concentrated on heavy industries such as shipbuilding, coal mining, steel production, and textiles. Tourism is very important to the British economy. With over 27 million tourists a year, the United Kingdom is ranked as the sixth major tourist destination in the world.

The United Kingdom is a constitutional monarchy with Elizabeth II, Queen of the United Kingdom of Great Britain and Northern Ireland, as the head of the state. Her power is not absolute, but it is limited by the Parliament which is headed by the Prime Minister. The Parliament of Great Britain consists of two Houses: House of Commons and House of Lords.

London is the capital of the country. There are four main districts in London: the West End, the East End, the City and the Westminster. The City is the business and financial center of London. There are a lot of banks, offices there. Stock Exchange is situated in the City.

London is famous for its great history. There are many places of interest there: Tower, Big Ben, Trafalgar Square, Buckingham Palace, Houses of Parliament, British Museum, etc.

A number of major sports originated in the United Kingdom, including football, rugby, cricket, tennis and golf. The most popular sport in the UK is football. The UK has proved its success in the international sporting arena in rowing. Rugby is a national sport. The game of tennis first originated from the UK's second city of Birmingham between 1859 and 1865. The Wimbledon Championships are international tennis events held in Wimbledon in south London every summer and are regarded as the most prestigious event of the global tennis calendar.

Great Britain is famous for its culture. Many well-known writers, poets, artists, scientists lived and worked there. They are Shakespeare, Dickens, Darvin, Newton, *etc*.

4.4. Read the statements and decide if they are true (T) or false (F).

1. The north-west of Europe is a place for the United Kingdom.
2. There are three countries that the United Kingdom consists of.
3. UK is an absolute monarchy.
4. There are two Houses in British Parliament: House of Commons and Senate.
5. The City is the cultural and scientific center of London.
6. The most popular sport in the UK is tennis.
7. The Prime Minister is responsible for the policy conducted by the Parliament.
8. Buckingham Palace is the place where the government of the country sits.

4.5. Complete the following sentences with the expressions from the box.

focuses on	**democratic traditions**	**tourist destination**
The most popular broadcaster	**is surrounded by densely**	**the most prestigious event majority religion**

1. … … … sport in the UK is football.
2. The country … … … the Atlantic Ocean and the Irish Sea.
3. The British economy … … the principles of liberalization, the free market, low taxation and regulation.
4. The BBC Corporation is the biggest and the largest … in the world.
5. The UK uses a parliamentary government based on strong … … .
6. The Wimbledon Championships is regarded as … … … … of the global tennis calendar.

7. Great Britain is one of the most … populated countries in Europe.
8. The United Kingdom is ranked as the sixth major … … in the world.
9. Christianity is the … … of the country.

4.6. Answer the following questions according to the text.

1. What is the geographical position of the United Kingdom?
2. What is the population of the country?
3. What are the main industries of Great Britain?
4. What is the capital of the UK?
5. How many parts are there in London?
6. What is the City?
7. What does the Parliament of Great Britain consist of?
8. Who is the Parliament headed by?
9. What are the places of interest in London?
10. What are major sports in Great Britain?
11. What famous people of the United Kingdom do you know?

Text B

HIGHER EDUCATION IN GREAT BRITAIN

Pretext exercises

4.7. Read the following words and try to guess their meaning.

Institution, investment, private, personal, local, lecture, seminar, final, examinations, philosophy, privilege, prestige, dominate, academically, federation, physical, rugby, central, laboratory, organize, tutor, medicine, business, basic.

4.8. Read the following words and notice their pronunciation.

adult	[ˋædʌlt] [əˋdʌlt]	undergraduate	[ˌʌndəˋgrædjuət]
society	[səˋsaɪətɪ]	tutorial	[tjuːˋtɔːrɪəl]
exception	[ɪkˋsepʃən]	essay	[ˋeseɪ]
private	[ˋpraɪvɪt]	acquire	[əˋkwaɪə]
authority	[ɔːˋθɔrɪtɪ]	particular	[pəˋtɪkjulə]

Memorize the following words and expressions

benefit	*выгода, польза, преимущество*	**residential rooms**	*жилые комнаты (помещения)*

society	*общество, общественность*	**tutorial system**	*университетская система обучения путем прикрепления студентов к отдельным консультантам*
private institution	*частный, негосударственный*	**academic merit**	*заслуга в учебе (достоинство)*
to pay fees	*вносить плату, оплачивать*	**mainly**	*главным образом, преимущественно, в основном*
living costs	*стоимость проживания*	**in this respect**	*в этом отношении*
expenses	*расходы, затраты*	**to tend to smth.**	*склоняться (иметь тенденцию) к чему-либо*
contribution to smth.	*вклад во что-либо*	**to be keen to do smth.**	*стремиться к чему-либо*
to dominate smth.	*доминировать, занимать господствующее положение*	**eminent**	*высокопоставленный, известный, знаменитый*
to be regarded as smth. (smb.)	*считать кем-либо, чем-либо*	**to scatter**	*размещать*
to assign	*назначать, определять*	**mostly**	*главным образом, по большей части*
compulsory	*обязательный (для всех), принудительный*	**attendance**	*посещаемость, посещение*
apart from	*помимо, кроме*	**individual tuition**	*индивидуальное обучение*
essay	*эссе, очерк, набросок*	**particular**	*индивидуальный, отдельный*
chapel	*часовня, молельня*		

4.9. Read the text.

HIGHER EDUCATION IN GREAT BRITAIN

The aim of education in general is to develop to the full the talents of both children and adults for their own benefit and that of society as a whole. It is a large-scale investment in the future. Higher education is not an exception.

When higher education is being spoken about the University education is generally meant. All British universities are private institutions. Students have to pay fees and living costs, but every student may obtain a personal grant from local authorities. If the parents do not earn much money, their children will receive a full grant which will cover all the expenses. Students studying for first degrees are known as undergraduates. New undergraduates in some universities are called freshers. They have lectures, there are regular seminars. After three or four years the students will take their finals or final exams. Those who pass examinations successfully are given the Bachelors degree: Bachelor of Arts for History or Bachelor of Science. The first postgraduate degree is Master of Arts, Master of Science. Doctor of Philosophy is the highest degree. It is given for some original research work which is an important contribution to knowledge.

The most oldest and famous universities in Britain are Oxford and Cambridge which dominated the British education for seven hundred years. Oxford and Cambridge (sometimes referred to as Oxbridge) are regarded as being academically superior to other universities and as giving special privilege and prestige.

Oxford University is a federation of twenty-three colleges for men and five for women. Each college has a physical existence in the shape of a dining-hall, chapel, and residential rooms. It is governed by its Fellows commonly called “dons”, of whom there are usually about twenty or thirty. The dons are also responsible for teaching the students of the college through the tutorial system. The Fellows elect the Head of the college.

The colleges vary very much in size and buildings. Colleges choose their own students, and a student only becomes a member of the University by having been accepted by a college. Students are chosen mainly on academic merit, but the policy of colleges in this respect varies from college to college.

Part of the teaching is by means of lectures and any student may attend any university lecture. At the beginning of each term (there are three terms in the Oxford academic year) a list is published showing all the lectures being given during the term within each faculty, and every student can choose which lectures he will attend, though his own college tutor will advise him which lectures seem likely to be more useful. Attendance at lectures is not compulsory, and no records of attendance are kept.

Apart from lectures, teaching is by means of the “tutorial” system, which is a system of individual tuition organized by the colleges. Each Fellow in a college is a tutor in his own subject to the undergraduates who are studying it. Each student goes to his tutor’s room once every week to read out an essay which he has written, and for an hour he and the tutor discuss the essay. A student does not necessarily go only to his own tutor but may be assigned to another don in his own college or in another college when he is studying some particular topic which is outside the special interest of his own tutor.

Higher-educational institutions in Britain include not only universities and colleges but also various professional schools that provide preparation in such fields as law, theology, medicine, business, music, and art. Higher education also includes

teacher-training schools, junior colleges, and institutes of technology. They don't give degrees to their students, they give only diplomas. The course of study there is usually shorter than at colleges. It lasts three or four years. Whereas at the universities students study five or even more years. The basic entrance requirement for most higher-educational institutions is the completion of secondary education, and the usual entrance age is about 18 years.

4.10. Read the statements and decide if they are true (T) or false (F).

1. All the universities in Britain are free.
2. In some universities students studying for first degrees are called freshers.
3. Doctor of Philosophy is the degree given for an important contribution to knowledge.
4. The colleges of Oxford are governed by the Queen of the country.
5. The colleges, university buildings and scientific laboratories are situated mostly in the central area.
6. Each undergraduate has his own tutor.
7. There are two terms in the Oxford academic year.
8. Students of Oxford can attend all the lectures seemed to be useful to them.
9. There are no records of attendance in the colleges of Oxford.
10. The universities of Great Britain are regarded as being academically superior to other universities in the world and as giving special privilege and prestige.

4.11. Match the following words and expressions with their equivalents.

1. basic requirements	a) журнал посещаемости
2. higher-educational institutions	b) в течение семестра
3. university entrance age	c) выбирать главу (главного) чего-либо
4. outside the interest	d) основные требования
5. records of attendance	e) включать (в себя) что-либо
6. aim of education	f) состоять из чего-либо
7. part of teaching	g) отличаться по размеру
8. during the term	h) учреждения высшего образования
9. to consist of smth.	i) несколько лет спустя
10. to include smth.	j) вне интереса (неинтерсно)
11. central area of the town	k) часть обучения
12. to vary in size	l) получение среднего образования
13. completion of secondary education	m) возраст для поступления в университет
14. to elect the head of smth.	n) центальная часть (район) города
15. a few years later	o) цель образования

4.12. Answer the following questions according to the text.

1. What is the aim of education in Great Britain?
2. Are the British Universities free of charge?
3. Do all the students receive a grant?
4. What academic degrees are there in British system of higher education?
5. In what way are Oxford and Cambridge Universities different from all the other universities of the UK?
6. What are the methods of teaching in British universities?
7. What is the tutorial system of education?
8. In what way are the professional schools different from universities?
9. Who can enter the higher-educational institutions?
10. Would you like to study at British universities? Why? Why not?

GRAMMAR

Revising Verbals

4.13. Complete the following sentences with the right forms, as in the model.

Model: **Having given** a promise he couldn't fail us. (*дав; **to give** - давать*)

1. … all his exams he decided to have a great party. (*сдав; **to pass** сдавать)*
2. Don't forget to stick a stamp when … the letter. *(отправляя; **to send** - отправлять)*
3. … at the airport we went to the check-in office. *(прибыв; **to arrive** - прибывать)*
4. … the children in the park, she remembered her childhood. *(наблюдая**; to watch** – наблюдать)*
5. He did it, not … of the result. *(думая; **to think** – думать)*
6. … of the window she saw an unknown man. *(выглянув; **to look out** – выглядывать)*
7. He was thinking about her … in the park. *(гуляя; **to walk** – гулять)*
8. I like the flowers … in the garden. *(растущие; **to grow** - расти)*

4.14. Complete the sentences, as in the model.

Model: **Having arrived** in London we went to Trafalgar square. (*to arrive*)

1. While … his car he was thinking about the result. (*to paint*)
2. It was dark so we had to stop several times … home. (*drive*)
3. … enough money he bought the desired book. (*to save*)

4. … a wallet in the street I wondered what I could do with it. (*to find*)
5. I spent the rest of the day … a few problems. (*to solve*)
6. The actress … the children fairy-tales is famous all over the country. (*to tell*)
7. … a cup of coffee she felt much better. (*to drink*)
8. … girl was hungry and tired. *(to cry)*

4.15. Choose the correct variant.

1. It seems to be a very … story.
   a) interesting b) interested
2. I can see a lot of people … at the bank.
   a) standing b) having stood
3. He stood for a moment ….
   a) frightened b) frightening
4. The largest painting was the last work … by the artist.
   a) doing b) done
5. You will probably find your sister ….
   a) growing b) grown
6. Everyone finds the circus ….
   a) exciting b) excited
7. She will pass all her exams successfully ….
   a) hardworking b) being hardworking
8. Things … in the open air market can't be of good quality.
   a) bought b) are being bought

4.16. Answer the questions using the gerund with a preposition *by*, as in the model.

Model: How can you make your mother happy? *(to have good results on exams)*
I can make my mother happy **by having good results on exams**.

1. How can you make enough money to buy a car? *(to win the lottery)*
2. How can you lose your weight? *(to join the gym)*
3. How can you find out if they are at home? *(to phone them)*
4. How can you keep fit? *(to do morning exercises)*
5. How can you avoid car accidents? *(to drive carefully)*

4.17. Use the right infinitive form (active or passive), as in the model.

Model 1: I'd like **to go** home early today. (*go*)
Model 2: He expected **to be met** by Helen at the station. (*to meet*)

1. Your watch will … by Tuesday. (*to repair*)
2. She must … her homework every day. (*to do*)
3. She hopes … for the student club. (*to choose*)
4. It's important … to people. (*to listen*)
5. Try … the letter in the morning. (*to post*)
6. They are going … married next Friday. (*to get*)
7. I want … the manager. (*to see*)

8. I prefer … by everybody. (*to listen*)
9. I went to the chemist's … some medicines. (*to buy*)
10. The boy wanted … for taking part in the competition. (*to reward*)
11. He was so happy … the first prize for his project. (*to receive*)
12. He wanted his son … at a public school. (*to educate*)
13. He is too young … the president. (*to be*)
14. She hoped … by everybody. (*to admire*)
15. We asked the driver … us a lift. (*to give*)
16. Alex is fortunate … a scholarship. (*to give*)

4.18. Point out the infinitive functions.

1. He is not the person to fail the exams.
a) subject b) attribute c) adverbial modifier

2. Not to be late for the lectures was impossible.
a) subject b) attribute c) adverbial modifier

3. I have a lot of time to finish my report.
a) subject b) attribute c) adverbial modifier

4. Italy is the best place to relax from work.
a) subject b) attribute c) adverbial modifier

5. He was talking for an hour without stopping to have some rest.
a) subject b) attribute c) adverbial modifier

6. To refuse the invitation was impolite.
a) subject b) attribute c) adverbial modifier

7. It takes me 10 minutes to get to the university.
a) subject b) attribute c) adverbial modifier

8. What a wonderful place to have a picnic!
a) subject b) attribute c) adverbial modifier

9. I don't believe it. It's too good to be the truth.
a) subject b) attribute c) adverbial modifier

10. To have a party in the garden is a wonderful idea.
a) subject b) attribute c) adverbial modifier

4.19. Choose the best translation, as in the model.

Model: Я рад, что мне рассказали эту историю.
✓ a) I am glad to have been told that story.
b) I am glad to tell that story.

1. Он будет счастлив посетить известную художественную галерею.
a) He will be happy to have visited the famous Art Gallery.
b) He will be happy to visit the famous Art Gallery.

2. Кажется, он знает французский не очень хорошо.
    a) He seems to have known French not very well.
    b) He seems to know French not very well.
3. Я очень рада, что сумела помочь Вам.
    a) I am glad to have helped you.
    b) I am glad to help you.
4. Я слишком устал, чтобы продолжать разговор.
    a) I am too tired to continue the conversation.
    b) I was too tired to continue the conversation.
5. Он первым написал статью.
    a) He was the first to have written the article.
    b) He is the first to write the article.
6. Я хочу пойти туда завтра.
    a) I want go there tomorrow.
    b) I want to go there tomorrow.
7. Я знаю его недостаточно хорошо, чтобы просить его о помощи.
    a) I don’t know him well enough to ask him for help.
    b) I don’t know him well enough to be asked for help.
8. Я уверен, что он первым придет на встречу.
    a) I am sure he was the first to come to the meeting.
    b) I am sure he will be the first to come to the meeting.
9. Сумма, которая должна быть уплачена, включает стоимость доставки.
    a) The amount to be paid includes the cost of delivery.
    b) The amount to pay includes the cost of delivery.
10. Наш план – поехать летом в Италию.
    a) Our plan is to have gone to Italy in summer.
    b) Our plan is to go to Italy in summer.

Unit 5 THE UNITED STATES OF AMERICA

Text A *The United States of America*
Text B *Higher Education in the USA*

Grammar: revising verbal constructions

Text A

THE UNITED STATES OF AMERICA

Pretext exercises

5.1. Read the following words and expressions and try to guess their meaning.

Constitutional, federal, republic, federal district, kilometers, population, cartographer, officially, declaration, fundamentally, structured, democracy, representative, legislative, executive, judiciary, congress, senate, declare, military, administer, policy, interpret, conservative, private, competitive, institution, community, individual.

5.2. Read the following words and notice their pronunciation.

hemisphere	[`hemɪsfɪə]	executive	[ɪg`zekjutɪv]
entirely	[ɪn`taɪəlɪ]	court	[kɔːt]
legislative	[`ledʒɪslətɪv]	embassy	[`embəsɪ]
judiciary	[dʒuː`dɪʃɪərɪ]	spectacular	[spek`tækjələ]

Memorize the following words and expressions

in the western hemisphere	*в западном полушарии*	**to appoint**	*назначать, утверждать*
to coin	*создавать (новые слова, выражения)*	**to enforce**	*придавать силу, проводить в жизнь*
independence	*независимость*	**an embassy**	*посольство*
to adopt	*принимать, усваивать, выбирать*	**to attend school**	*посещать школу*

legislative power	*законодательная власть*	**to allow**	*позволять, разрешать, допускать*
executive power	*исполнительная власть*	**to enroll**	*регистрировать, вносить в список*
judiciary power	*судебная (юридическая) власть*	**spectacular sport**	*зрелищный спорт*
to approve	*одобрять, утверждать*	**to eclipse**	*затмевать, заслонять*
a treaty	*договор, переговоры*		

5.3. Read the text.

THE UNITED STATES OF AMERICA

The United States of America is a federal constitutional republic that comprises fifty states and a federal district. The country is situated almost entirely in the western hemisphere. They border on Canada in the north and Mexico in the south. The total area of the country is 9.83 million square kilometers with over 300 million people. The United States is the third largest country by total area, and the third largest country by land area and by population.

The term *Americas* was coined in the early 16th century after Amerigo Vespucci, an Italian explorer and cartographer. The full name of the country was first used officially in the Declaration of Independence, which was adopted on July 4, 1776.
The United States is a constitutional republic, which is fundamentally structured as a representative democracy. Federal government is composed of three branches: legislative, executive and judiciary.

- A legislative branch is represented by the Congress, which consists of the Senate and the House of Representatives. The Congress makes federal law, declares war, approves treaties, has the power of the purse, and has the rarely used power of impeachment.
- An executive branch is represented by the president who can veto legislative bills before they become law, and appoints the Cabinet and other officers, who administer and enforce federal laws and policies.
- A judiciary branch consists of the Supreme Court and lower federal courts, whose judges are appointed by the president with Senate approval, interpret laws and can overturn laws they deem unconstitutional.

The president serves a four-year term and may be elected no more than twice. Since the general election of 1856, the two dominant parties have been the Democratic Party (liberal), founded in 1824 and the Republican Party (conservative), founded in 1854.

The United States has vast economic, political, and military influence on a global scale. Almost all countries have embassies in Washington, D.C.

Washington is the capital of the country. It is not a large city; its population is about 500.000 people. In Washington there is the White House where the President lives and works and the Capitol where the Congress of the United States sits.

American public education is operated by state and local government. Children are obliged to attend school from the age of six or seven until they turn eighteen. Some states allow students to leave school at sixteen or seventeen. About 12 percent of children are enrolled in private schools. Just over 2 percent of children are homeschooled. The United States has many competitive private and public institutions of higher education There are also many smaller universities and liberal arts colleges, and local community colleges of varying quality with open admission policies.

Since the late 19th century, baseball has been regarded as the national pastime; football, basketball, and ice hockey are the country's three other leading professional team sports. Football is now the most popular and the most spectacular sport in the United States. Boxing and horse racing were once the most watched individual sports, but they have been eclipsed by golf and auto racing.

The United States of America has always been the leading in all the spheres of life and technology.

The flag of the United States is called "stars and stripes". There are fifty stars on the blue background and thirteen stripes. The number of the stars corresponds to the number of the states. And thirteen stripes mean the number of the first original states.

5.4. Read the following statements and decide if they are true (T) or false (F).

1. Canada and Mexico are the two neighboring countries of the USA.
2. There is hardly a country which has its own embassy in the USA.
3. The US is the largest country in the world.
4. The Congress of the United States consists of the Senate and the House of Commons.
5. The Democratic and Republican Parties are two dominant parties in the US policy.
6. There are fifteen stars on the US flag.
7. Washington is one of the largest cities of the country.
8. New-York is the capital of the country.
9. The President of the country is elected every five years.
10. Football is the most popular sport in the United States.

5.5. Answer the following questions according to the text.

1. Who is the President of the USA at the moment?
2. Which countries does the USA border on?
3. Is English an official language of the USA?

4. How many branches is Federal government composed of?
5. What are the most popular sports in the USA?
6. Is horse racing the most spectacular sport in the USA?
7. How many political parties are there in the USA? When were they founded?
8. What types of schools are there in the USA?
9. Who operates American public education?
10. What famous people lived and worked in the USA?
11. What does the Congress of the USA consist of?
12. How is the flag of the US called? Why?

Text B

HIGHER EDUCATION IN THE USA

Pretext exercises

5.6. Read the following words and expressions and try to guess their meaning.

Progress, nation, public, private, institutions, diploma, arithmetic, automatic, basic, type, academic, college, local, course, career, examination, activity, standard, prestige, concentrate, philosophy, professor, faculty, instructor, assistant.

5.7. Read the following words and notice their pronunciation.

private	[`praɪvɪt]	chorus	[kɔːrəs]
curriculum	[kə`rɪkjələm]	designate	[`dezɪgneɪt]
scholastic	[skə`læstɪk]		

Memorize the following words and expressions

swift	*стремительный, быстрый*	**ability tests**	*тест способностей (обучения в колледже)*
to graduate school	*закончить школу*	**credit**	*зачетная единица*
secondary education	*среднее образование*	**to award**	*присуждать, награждать, присваивать*
elementary school	*начальная школа*	**to admit**	*допускать, принимать*
completion	*завершение, окончание*	**rigid**	*строгий, суровый*
compulsory	*обязательный, принудительный*	**scholastic**	*учебный (преподавательский)*

grade	*оценка*	**requirements**	*требования, условия*
emphasis	*акцент, ударение*	**extra-curricular activity**	*внеучебная деятельность*
admission	*прием, принятие*	**to take into consideration**	*принимать во внимание (к сведению)*
curriculum	*курс обучения, учебный план*	**bachelor's degree**	*степень бакалавра*
vocational education	*профессиональное образование*	**post-graduate education**	*послеуниверситетское образование*
school board	*школьный совет, (комитет)*	**follow the course**	*проходить обучение по какому-либо курсу (программе)*
freedom of choice	*свобода выбора*	**to designate**	*назначать, номинировать*
guidance counselor	*руководящий советник (консультант)*	**academic rank**	*учебное звание (чин)*
an aptitude	*склонность, способность*		

5.8. Read the text.

HIGHER EDUCATION IN THE USA

"Our progress as a nation can be no swifter than our progress in education."

J. Kennedy

In the United States, education is offered at all levels from kindergarten to graduate school by both public and private institutions. Elementary and secondary education involves 12 years of schooling, the successful completion of which leads to a high school diploma. Education is free and compulsory in all states, from the age of 6 till 16 (or 18).

Children move on to high school or secondary school in the ninth grade, where they continue until the twelfth grade. Admission to the American high school is automatic on completion of the elementary school. There are two basic types of high schools: one with a more academic curriculum, preparing students for admission to college, and the other offering primarily vocational education.

In order to receive the high school diploma necessary in most states to get into college, students must accumulate a minimum number of credits, which are awarded for the successful completion of each course. Students hoping to be admitted to the more famous universities such as Harvard, Princeton, and Yale, have rigid scholastic

requirements for entrance, including an examination. Extra-curricular activity (such as playing for one of the school's sports teams, working on the school newspaper, or singing in a chorus) is also very important in the American school system and is taken into consideration by colleges and employers.

There are about 3,000 colleges and universities, both private and public, in the United States. They all offer their own choice of studies, setting their own admission standards and deciding which students meet those standards. The greater the prestige of the university, the higher the credits and grades required.

The terms college and university are often used interchangeably, as college is used to refer to all undergraduate education and the four-year undergraduate programme, leading to a bachelor's degree. Universities tend to be larger than colleges and also have graduate schools where students can receive post-graduate education.

During the first two years students usually follow general courses in the arts or sciences and then choose a major (the subject or area of studies in which they concentrate, the other subjects are called minors). Credits (with grades) are awarded for the successful completion of each course. It usually takes four years to meet the requirements for a Bachelor of Arts or Bachelor of Science degree. A Master of Arts or Master of Science degree may be obtained in one or two additional years. The highest academic degree is the Doctor of Philosophy. It may take any number of years to complete the original research work necessary to obtain this degree.

The executive head of a college or a university is usually called the president. The various colleges or schools which take up a university are headed by deans. Within a school or college there may be departments according to subject matter fields, each of which may be headed by a professor who is designated as department head or chairman. Other members of the faculty hold academic ranks, such as instructor, assistant professor, associate professor, and professor.

5.9. Read the following statements and decide if they are true (T) or false (F).

1. One has to pay in order to study at American public schools.
2. There are twelve grades in American schools.
3. The US is the largest country in the world.
4. At a high school students can get vocational education.
5. When completing each course at a college students get credits.
6. Extra-curricular activities are taken into consideration when entering the university.
7. You can obtain a bachelor's degree at American colleges as well as at universities.
8. Bachelors have to study one or two additional years to obtain a Master of Science degree.
9. It is necessary to complete original research work to be the Doctor of Philosophy.
10. The executive head of a college or a university is a guidance counselor.

5.10. Answer the questions to the text.

1. What age do children start the education in the USA?
2. How many types of high schools are there in the USA? What are they?
3. Do you have to get the high school diploma to enter a college?
4. What types of colleges and universities are there in the system of education in America?
5. What is the difference between a college and a university?
6. Can you obtain a Master degree at a college?
7. Who are college departments headed by?
8. Is the curriculum the same in American high schools?
9. What do Russian and American universities have in common?
10. Would you like to get education in the USA? Why? Why not?
11. What famous people lived and worked in the USA?
12. What does the Congress of the USA consist of?
13. How is the flag of the US called? Why?

GRAMMAR

Revising Verbal Constructions

5.11. Choose the best translation.

1. Я не возражаю, если вы переведете другую статью.
a) I don't mind your translating another article.
b) I don't mind translating another article.
2. Она расстроилась, так как ее брат не сдал экзамены.
a) She felt upset her brother's having failed exams.
b) She felt upset having failed her brother's exams.
3. Я помню, что мечтал полететь в космос.
a) I remember my dreaming to fly into space.
b) I remember me to dream to fly into space.
4. Мы с нетерпением ждем, когда родители переедут.
a) We look forward our parents moving the house.
b) We look forward to moving the house.
5. Мне нравится, когда все студенты участвуют в эксперименте.
a) I like all the students take part in experiment.
b) I like taking part in experiment with all the students.

5.12. Change the following sentences paying attention to gerund construction, as in the model.

Model: He plays the guitar very well. We enjoy it.
We enjoy **his playing** the guitar.

1. They asked her to wait for an hour. I didn't mind it.
2. He earns a lot of money working extra hours. His parents are happy of it.
3. They go to Spain for holidays. We are sorry about it.
4. George has given us his camera. We are thankful for it.
5. They play music at night very loudly. The neighbours complain about it.
6. He complains at the results of exams. She feels angry.
7. Peter usually wins the swimming competition. I am always informed about it.
8. She came late. I was very surprised.
9. They didn't sign the contract. I don't see the reason for it.
10. They say you argue with the boss. I don't remember it.

5.13. Choose the best translation.

1. They said to have made wrong decision.
   a) Считают, что они приняли неверное решение.
   b) Решение, принятое ими**,** было неправильным.
2. You are sure to become a good specialist in radioengineering.
   a) Вы обязательно станете хорошим специалистом в радиотехнике.
   b) Вы уверены, что станете хорошим специалистом в радиотехнике.
3. Your article is considered to be the best in this scientific magazine.
   a) Ваша статья – лучшая в этом научном журнале.
   b) Считают, что ваша статья – лучшая в этом научном журнале.
4. The experiment is supposed to be finished in January.
   a) Предполагают, что эксперимент будет закончен в январе.
   b) Эксперимент обязательно будет закончен в январе.
5. The results of the elections are expected to be announced tomorrow.
   a) Результаты выборов будут объявлены завтра.
   b) Ожидают, что результаты выборов будут объявлены завтра.

READING COURSE

Unit 1. COMMUNICATION

Text A *History of Communication Systems*
Text B *History of Radio*

Grammar: functions of the verbs *to be, to have, to do*; multifunctional words *it, one, that*; adjectives and adverbs: degrees of comparison

Text A

HISTORY OF COMMUNICATION SYSTEMS

Pretext exercises

1.1. Read the following words and expressions and try to guess their meaning.

Signal, visual telegraphy, communication system, operator, interval, kilometer, commercial, electrical telegraph, transatlantic, message, version, to demonstrate, international, Internet, Atlantic, service, Nobel Prize, mechanical, device, disk, mile, television, problem, teletype, calculator, results, computer, protocol.

1.2. Read the following words and notice their pronunciation.

visual	[`vɪʒuəl]	Guinea	[`gɪnɪ]
telegraphy	[tə`legrəfɪ]	interval	[`ɪntəvəl]
allow	[ə`lau]	commercial	[kə`mə:ʃəl]
major	[`meɪʤə]	silhouette	[ˌsɪlu`et]
cathode	[`kæsəud]	centralized	[`sentrəlaɪzd]
result	[rɪ`zʌlt]	control	[kən`trəul]
microscopy	[maɪ`krɔskəpɪ]		

Memorize the following words and expressions

to suffer (from)	*иметь недостатки*	**to rely upon, to depend on**	***зд.*** *базироваться на*
skilled	*квалифицированный, опытный*	**Nipkow disk**	*диск Нипкова*
to abandon	*закрывать; ликвидировать*	**cathode ray tube (CRT)**	*электронно (катодно)-лучевая трубка (ЭЛТ)*
to allow	*делать возможным*	**computed result**	*вычисленный результат*
telephone exchange	*телефонная станция*	**chunk**	*большое количество*

conventional	*обычный; традиционный*	**packet switching**	коммутация пакетов, пакетная коммутация
major city	*крупный город*	**centralized mainframe**	*центральная ЭВМ*
to share	*разделять (что-л. с кем-л.); использовать совместно*		

1.3. Read the text.

HISTORY OF COMMUNICATION SYSTEMS

The history of communication is an important part of the larger history of communication. Early communications included smoke signals and drums. Drums were used by natives in Africa, New Guinea and South America, and smoke signals in North America and China.

In 1792, a French engineer, Claude Chappe built the first visual telegraphy (or semaphore) system between Lille and Paris. However, semaphore as a communication system suffered from the need for skilled operators and expensive towers often at intervals of only ten to thirty kilometers (six to nineteen miles). As a result, the last commercial line was abandoned in 1880.

The first commercial electrical telegraph was constructed in England by Sir Charles Wheatstone and Sir William Fothergill Cooke. The first successful transatlantic telegraph cable was completed on the 27th of July, 1866, allowing transatlantic telecommunication for the first time.

The conventional telephone was invented by Alexander Bell in 1876. The first commercial telephone services were set-up in 1878 and 1879 on both sides of the Atlantic in the cities of New Haven and London. The technology grew quickly; intercity lines and telephone exchanges were built in every major city of the United States by the mid-1880s.

In December 1901, Guglielmo Marconi established wireless communication between Britain and the United States; he received the Nobel Prize for physics in 1909 (which he shared with Karl Braun).

On the 25th of March, 1925, Scottish inventor John Logie Baird publicly demonstrated the transmission of moving silhouette pictures at the London department store Selfridges. Baird's first devices relied upon the Nipkow disk and thus became known as the mechanical television.

However, most of the 20th century televisions depended upon the cathode ray tube invented by Karl Braun. John Logie Baird switched from mechanical television and became a pioneer of colour television using cathode-ray tubes.

In September 1940, George Stibitz was able to transmit problems using teletype to his Complex Number Calculator in New York and to receive the computed results back at Dartmouth College in New Hampshire. In the 1960s, researchers started investigating packet switching – a technology that would allow chunks of data to be sent to different computers without first passing through a centralized mainframe. In September 1981, RFC 791 introduced the Internet Protocol v4 (IPv4) and RFC 793 introduced the Transmission Control Protocol (TCP) – thus creating the TCP/IP protocol that much of the Internet relies upon today.

Internet access became widespread late in the century, using the old telephone and television networks.

Notes to the text

Complex Number Calculator	компьютер, умеющий выполнять вычисления над комплексными числами
Internet Protocol = IP	протокол Интернет, протокол IP
RFC (Request for Comments)	запрос на комментарий «предлагается к обсуждению»
Transmission Control Protocol	протокол управления передачей

1.4. Choose the correct variant and complete the following sentences.

1. The first commercial electrical telegraph was constructed by …
   a) George Stibitz.
   b) Guglielmo Marconi.
   c) Sir Charles Wheatstone and Sir William Fothergill Cooke.

2. The conventional telephone was invented by …
   a) John Logie Baird in 1845.
   b) Alexander Bell in 1876.
   c) George Stibitz in 1940.

3. In December 1901, Guglielmo Marconi …
   a) established wireless communication between Britain and the United States.
   b) became a pioneer of colour television.
   c) invented the conventional telephone.

4. On the 25th of March, 1925, Scottish inventor John Logie Baird …
   a) started to investigate packet switching.
   b) publicly demonstrated the transmission of moving silhouette pictures.
   c) constructed the first commercial electrical telegraph.

1.5. Answer the questions to the text.

1. What did early telecommunications include?
2. Who were drums and smoke signals used by?
3. When was the first visual telegraphy (or semaphore) system built?
4. Why was the last commercial line abandoned?
5. Where was the first commercial electrical telegraph constructed?

6. Where were the first commercial telephone services set-up?
7. What became known as the mechanical television?
8. Who is considered to be a pioneer of colour television?
9. What years did researchers start investigating packet switching?
10. When was Transmission Control Protocol introduced?

Text B

HISTORY OF RADIO

Pretext exercises

1.6. Read the following words and notice their pronunciation.

discharge	[dɪs`ʧɑːʤ]	genius	[`ʤiːnɪəs]
medium	[`miːdɪəm]	ether	[`iːθə]
circuit	[`səːkɪt]	diaphragm	[`daɪəfræm]
interference	[ɪntə`fɪərəns]	circumference	[sə`kʌmfərəns]
contemporary	[kən`tempərərɪ]	society	[sə`saɪətɪ]
associate	[ə`səuʃɪeɪt]		

1.7. Read the words and try to guess their meaning.

Physicist, phenomenon, stress, reality, concept, theory, component, battery, apparatus, centre, radius, technique, natural, idea, genius, experiment, radio, atmosphere, system, telegraph, communication, telephone, radiation.

Memorize the following words and expressions

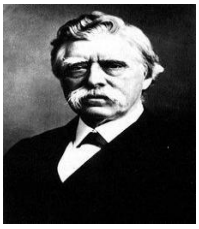
current	*электрический ток*	**wire**	*провод*
circuit	*цепь, схема, контур*	**wireless**	*беспроводный*
to receive	*получать, принимать*	**to equip**	*оборудовать*
to produce	*производить*	**to generate**	*вырабатывать*
to transmit	*передавать*	**to reduce**	*уменьшать*
to invent	*изобретать*	**wavelength**	*длина волны*
to discover	*открывать*	**to contain**	*содержать, вмещать*
to convert	*преобразовать*	**to consist of**	*состоять из*
to use	*использовать*	**power**	*мощность, энергия*
to charge	*заряжать*	**to mean**	*значить, означать*
to discharge	*разряжать*	**means**	*средство, способ*
to oscillate	*колебаться*	**mean**	*средний*
wave	*волна*	**by means of**	*с помощью, посредством*
velocity	*скорость*	**to call**	*называть*
to equal	*равнять(ся)*	**to change**	*менять*
to detect	*обнаруживать*	**to propagate**	*распространять(ся)*
to measure	*измерять*	**field**	*поле, область, отрасль*
branch	*отрасль, область*		

1.8. Read the text.

HISTORY OF RADIO

Within the history of radio, several people were involved in the invention of radio and there were many key inventions in what became the modern system of wireless. Radio development began as "wireless telegraphy". Radio was developed along with two other key inventions, the telegraph and the telephone. During the early development of wireless technology and long after its wide use people disputed who invented the radio. The matter was important for economic, political and nationalistic reasons.

The history of radio begins perhaps with Joseph Henry, an American physicist, who discovered in 1842 that electrical discharges were oscillating. Then a step forward was taken by James Maxwell, a Scottish physicist and one of the great mathematical geniuses of the 19th century. By means of mathematical reasoning Maxwell showed that all electrical and magnetic phenomena could be reduced to stresses and motions in the medium, which he called the ether. Today we know that this electrical medium does not exist in reality. Yet this concept helped greatly, and allowed Maxwell to put forward his theory that the velocity of electric waves in air should be equal to the velocity of light waves. Both of them were the same kind of waves and differed only in wave length.



In 1878, David Hughes, an American physicist, made another important discovery in the history of radio. He found that a loose contact in a circuit containing a battery and a telephone receiver would give rise to sounds in the receiver which corresponded to the sounds that hit the diaphragm of the mouthpiece. Hughes contemporaries claimed that the detected effects were due to electromagnetic induction. The scientist used his apparatus to transmit over a few hundred yards, using a transmitter and a receiver.

Next we must turn to Heinrich Hertz, the famous German physicist, who was the first to create, detect and measure electromagnetic waves. He experimentally confirmed Maxwell's theory. However, Hertz did not devise a system for actual general use nor describe the application of the technology. He only demonstrated that radio radiation had all the properties of waves (now called electromagnetic radiation). His setup for a source and detector of radio waves (then called Hertzian waves) contained a primitive radio system capable of transmitting and receiving radio waves through free space. Hertz could detect radio waves about 20 meters from the transmitter in his laboratory. He did not try to transmit further because he wanted to prove electromagnetic theory, not to develop wireless communication.

In 1895, Russian scientist A.S. Popov demonstrated the first radio receiver which he called "an apparatus for the detection and registration of electric oscillations". He became the inventor of the radio, and May 7 is celebrated each year as 'Radio Day' in the Russian Federation.

The word “radio” comes from the Latin word “radius” – a straight line drawn from the centre of a circle to a point on its circumference. The term “radio” now means the radiation of waves by transmitting stations, their propagation through space and reception by receiving stations. The radio technique has become closely associated with many other branches of science and engineering.

Notes to the text

in what became	*в том, что стало*
to take a step forward	*сделать шаг вперед*
by means of mathematical reasoning	*при помощи математических рассуждений*
could be reduced to	*можно свести к*
give rise to	*способствовать*
to put forward	*выдвигать*
was the first to create	*первым создал*

1.9. Read the following statements and decide if they are true (T) or false (F).

1. Only few people were involved in the invention of radio.
2. Radio was developed along with telephone and telegraph.
3. Hertz put forward the theory of the ether.
4. Electrical waves and light waves have different wave length.
5. Hertz tried to develop wireless communication.
6. Popov invented the first radio receiver.
7. The term “radio” means the detection and registration of electric oscillations.

1.10. Answer the questions to the text.

1. What scientists were involved in the invention of radio?
2. Who discovered the oscillations of electric discharges?
3. What was Maxwell famous for?
4. Does the ether exist in reality?
5. What discovery did David Hughes make?
6. What did Hertz try to do?
7. Who was the inventor of radio?
8. Where does the word “radio” come from?
9. What does the term “radio” mean now?
10. Is radio used today only for communication?

1.11. Discuss the following topics.

1. Early means of communication.
2. The importance of communication in our life.
3. First important discoveries in the field of radio.
4. The role of radio in modern society.

GRAMMAR

Functions of the verbs *to be, to have, to do*

1.12. Read the following sentences and translate them. Pay attention to the functions of the verbs *to be, to have*.

1. Automatic systems **have** many advantages.
2. The scientist **will have** to improve the quality of this machine.
3. The information **has been based** on the data received from a computer.
4. In the application of electronic instruments the engineer must **have** knowledge of their characteristics.
5. They **were** to complete their research last year.
6. Electronics **is being used** more and more in many fields of our life.
7. The electron **is** a negative particle of electricity.
8. They **have passed** the examination in electrical engineering.
9. Gamma rays **have** no electric charge.
10. The new method **is used** to investigate these phenomena.
11. The scientists **had** to stop their experiment.
12. We **are** to do this work just now.
13. The new theory **was** to be used for analyzing the experimental data.
14. The measuring device **was tested** by the group of researchers.
15. The data obtained by our students **are** in the table.
16. Final results **will be presented** at the conference.
17. The nucleus of the atom **is** in its centre.
18. We **are** to translate technical literature in the course of study.
19. Technical progress **is** now impossible without high-quality materials.
20. It **is** the only positive solution.

1.13. Fill in the gaps with correct forms of the verbs *to be, to have* and there + *to be* construction.

1. The results of the experiment … very important for our further work.
2. There … no chemical plant in out city last year.
3. Cosmic television … a great future.
4. Our planet … powerful sources of energy.
5. You will … go to the library to get this book.
6. The electron … a negative particle of electricity.
7. The temperature … five degrees below zero yesterday.
8. My friends … mostly students.
9. They … many new subjects next term.
10. The electron … almost the same mass as the proton.
11. There … an interesting lecture next week.
12. Our University … 50 years old.

13. There … many modern laboratories in their institute.
14. In 5 years they … engineers.
15. He will … do this work by the end of the week.

1.14. Read and translate the following sentences. Pay attention to the functions of the verb *to do*.

1. He **will do** the work himself.
2. Where **does** he study?
3. Lasers **do** possess many wonderful properties.
4. Semiconductors pass electric current more easily than insulators **do**.
5. I **don't** understand the action of this device.
6. Energy is defined as ability **to do** work.
7. The scientist **did** obtain new properties with the substance.

Multifunctional words *it, one, that*

1.15. Read the following sentences and translate them. Pay attention to the functions of the words *one (ones), it, that (those).*

1. Computers are devices **that** are capable of rapid and accurate calculations.
2. **It** took 5 years to develop the machine.
3. A given problem can have more than **one** algorithm for **its** solution.
4. The experimental technique was similar to **that** described previously.
5. **It** is necessary to protect the human eye when laser beams are being used.
6. Circuits **that** can perform this logical operation and similar **ones** have been built and tested.
7. The atoms and molecules **that** make up all the forms of matter are in constant motion.
8. **It** is the computer **that** makes a machine a robot.
9. The new devices have a number of advantages over the old **ones**.
10. **It** was Einstein who provided a new conception of time, space and gravitation.
11. **One** must always be careful when working with this machine.
12. I know only **one** solution of this problem.
13. **It** is the program that ensures the execution of all the operations assigned to the computer.
14. In future power stations will use the principle of direct conversion of solar energy into electric **one**.
15. Due to radioactive elements **one** can measure the thickness of various materials.
16. **That** higher education in the country is accessible to all is known to everybody.
17. **It** is known **that** the knowledge of general engineering subjects is the basis for the study of special subjects.
18. **It** is the computer **that** has completely changed our life.

19. Engineering is one of the most important professions; **it** is the **one that** is taught at technical universities.
20. **One** must pass all the exams well to enter the university.
21. The program for the first-year students differs from **that** for the third-year students.
22. **It** has become evident **that** ecological problems can be solved only on the global level.
23. **It** is the development of robots **that** will solve some very complex problems of industry.
24. The use of the new equipment made **it** possible to minimize the number of workers.

Adjectives and adverbs: degrees of comparison

1.16. Form comparative and superlative degrees of the following adjectives and adverbs.

Fast, bad, quick, hard, little, many, heavy, quickly, good, few, badly, much, progressive, early, well, far, high, difficult.

1.17. Put the adjectives into comparative or superlative degrees.

1. Moscow University is … University on Europe. (*large*)
2. Strength of materials is … than chemistry. (*difficult*)
3. It is … to study at the institute than at school. (*interesting*)
4. My friend works … at his English than I. (hard)
5. The University is one the … buildings in Moscow. (*old*)
6. Our group studies … than theirs. (*good*)
7. The new transistor is … than the old one. (*powerful*)
8. The program for the first-year students is … than for the third-year students. (*difficult*)
9. There are … technical articles in this journal. (*interesting*)
10. He has … qualification of all the applicants. (*high*)
11. She was not satisfied with the results because they were … in her class. (*bad*)
12. My friend is … student in our group. (*good*)
13. I know physics … than my friend does. (*bad*)
14. It took them … time to get to the University because they went by bus. (*little*)
15. You should study … to get … qualification in your speciality. (*hard, high*)

1.18. Translate the following sentences paying attention to the degrees of comparison.

1. Disk recording is neither **better** nor **worse** than cylinder recording.
2. Sales of LPs fell by 35 percent to **less than** 25 million.
3. **Less** attention was paid to another possible way of conducting the experiment.
4. This is **the least** acceptable variant.
5. Such transformations occur **much more** frequently.

6. The book contains **far more** than its title implies.
7. The second limitation is **far more serious.**
8. This is **the least important** fact.
9. **The higher** your expectations, **the greater** will be your disappointment.
10. **The higher** the temperature, **the lower** the pressure, **less** time is required.
11. The main objective is to provide a **more convenient** definition for the task.
12. This rule is **as important as** the above rule.
13. Transistors allowed to produce **smaller, simpler** and **less expensive** computers with the high performance for the future.
14. Relatively **less** attention has been paid to another possible way of obtaining a **better** performance for the memory.

1.19. Answer the following questions.

1. Which is the most difficult subject for you?
2. Which is the easiest subject?
3. Which of the subjects is more difficult: physics or mathematics?
4. Who is the tallest in your group?
5. Which is the most interesting subject for you?
6. Is English as difficult as mathematics?
7. Do you study well?
8. Who is the youngest in your family?
9. Is your father older than your mother?
10. Are the conditions for living in a hostel good? Why?
11. Is to study at the University hard? Why?

1.20. Translate the following sentences.

1. The bigger the cities are, the greater the pollution.
2. The more computers and robots are used in industry, the quicker the technological progress will be.
3. The more automobiles appear in the streets, the worse the air in the cities is.
4. The more effective is the technology, the quicker is the development of the country.

5. The quicker we join our efforts in protecting the environment, the quicker the ecological problems are solved.

Unit 2. ELECTRONIC DEVICES

Text A *The Age of Electronics*
Text B *Transistor*

Grammar: tenses of the active voice

Text A

THE AGE OF ELECTRONICS

Pretext exercises

2.1. Read the following words and try to guess their meaning.

Electron, nature, revolution, technology, practice, electricity, device, transistor, result, space, tube, action, television, distance, information, communication, vacuum, electrode, classify, diode, operate, voltage, current, semiconductor, insulator, attention, receiver, acceleration.

Memorize the following words and expressions

investigation	*исследование*	**grid**	*сетка, решетка*
valve	*электронная лампа*	**to require**	*требовать*
tube	*электронная лампа, трубка*	**plate**	*пластина, плата*
device	*устройство, прибор*	**substance**	*вещество*
equipment	*оборудование*	**to handle**	*оперировать*
copper	*медь*	**junction**	*соединение, переход*
internal	*внутренний*	**temporary**	*временный*
envelope	*оболочка*	**to destroy**	*разрушать*
to flow	*проходить, протекать (о токе)*	**rectifier**	*выпрямитель*
to pass	*проходить (о токе), пропускать (ток)*	**pulse circuit**	*импульсная схема*
semiconductor	*полупроводник*	**to emit**	*излучать, испускать*
according to	*согласно чему-л.*	**solid state**	*твёрдое тело*
filament	*нить, волокно*	**amplifier**	*усилитель*

2.2. Read the text.

THE AGE OF ELECTRONICS

Electronics is the science or practice of using electricity in devices similar to transistors and radio tubes so as to get results not possible with ordinary electrical equipment. Here the electricity always flows in the copper wire or other metal conductors. When electricity passes through space as occurs within a tube or through the junction as in a transistor, such action is called electronic. Thus, if a device passes its stream of electrons through internal space or through the junction, the device is called electronic.

Without electronics there might be no radio, television, sound pictures or long-distance telephone calls. Most of these familiar equipments serve to carry or to give information; so from the very beginning communication was a main purpose of electronics.

The science of electronics now deals almost exclusively with transistors or other solid-state devices. However, until approximately 1955 vacuum tubes were the principle building blocks of electronic circuits. A vacuum tube consists of several metal electrodes of various shapes all packaged inside a glass or metal envelope which is highly evacuated. A red hot electrode (filament or cathode) emits electrons which are attracted to a positively charged electrode called the plate or anode. The electrons pass through the spaces in a metallic grid electrode on their way to the plate, and the voltage on the grid controls how many electrons reach the plate. Vacuum tubes are classified according to the number of electrodes. A diode is a valve with two electrodes. A triode has three electrodes: a filament, a plate and a control grid, and so on.

Vacuum tubes are still widely used in oscilloscopes, high power high frequency radio transmitters and in some special low noise amplifiers. As a general rule, they are inferior to modern solid-state devices in many ways. Vacuum tubes are much larger. They require considerably more electric power to operate. However, they can handle high voltages and high powers at high frequencies somewhat more easily than solid-state devices. They are also capable of withstanding temporary overloads in voltage or current which would destroy a solid-state device and then returning to normal operation.

In 1948, American scientists Bardeen, Brattain and Shockley invented the first transistor. At present transistors are widely used in amplifies, receivers, transmitters, oscillators, TV sets, measuring instruments, pulse circuits, computers and many other types of radio equipment. The invention of transistors and solid-state devices led to acceleration in the growth of electronics. Transistors are made from parts which do not wear out. They waste very little power. They require no heating to generate their free electrons. This means that equipment made with transistors is more efficient, lighter than comparable valve equipment.

2.3. Read the following statements and decide if they are true (T) or false (F).

1. The discovery of electron didn't influence physical science.
2. It is possible to get the same results with ordinary electrical equipment as with transistors and radio tubes.
3. The device is called electronic if the stream of electrons passes through an electric copper wire.
4. The aim of electronics was to improve communication.
5. Vacuum tubes are classified according to the number of electrodes.
6. Vacuum tubes are much less than solid-state devices.
7. Parts of transistors wear out very quickly.
8. Equipment made with transistors weighs much more in comparison with valve equipment.
9. Transistors waste very much power.
10. A filament, a plate and a control grid are parts of a diode.
11. Electronics doesn't serve to carry information.

2.4. Answer the questions to the text.

1. What is electronics?
2. How are vacuum tubes classified?
3. What device is called electronic?
4. What is a semiconductor?
5. When was the first transistor invented?
6. What led to the acceleration in the growth of electronics?
7. What is the main purpose of electronics?
8. What are the advantages of transistors?
9. What are the advantages of vacuum tubes?
10. Where are vacuum tubes still widely used?
11. What led to a revolution in physical science?
12. Who invented the first transistor?
13. In what direction do the electrons move?

Text B

TRANSISTOR

Pretext exercises

2.5. Read the following words and expressions and try to guess their meaning.

Key element, electronics, invention, importance, process, produce, discrete, component, circuit, control function, design, terminal, property, output, signal processing, reproduction, amplifier, input, include, current, switch, apply, application, operation, digital circuit, valve, vacuum tube, equipment, replace, voltage, heater, intensity, vibration, limitation, broadcasting, sensitive, mobility.

2.6. Read the following words and notice their pronunciation.

reliability	[rɪˌlaɪə`bɪlɪətɪ]	predecessor	[`priːdɪˌsəsə]
majority	[mə`ʤɔrətɪ]	application	[ˌæplɪ`keɪʃn]
determine	[dɪ`təːmɪn]	manufacturing	[ˌmænjə`fæʧərɪŋ]
relevant	[`reləvənt]	ruggedness	[`rʌgɪdnəs]
vibration	[vaɪ`breɪʃn]	intensity	[ɪn`tənsətɪ]
ubiquitous	[juː`bɪkwɪtəs]	frequency	[`friːkwənsɪ]

2.7. Translate the following attribute groups.

1. semiconductor device fabrication
2. control function
3. equivalent mechanical control function
4. sound reproduction
5. signal processing
6. modern transistor audio amplifier
7. high power application
8. switched-mode power supply
9. highly automated manufacturing process
10. battery-powered application
11. high frequency operation
12. over-the-air television broadcasting
13. electron mobility
14. atmospheric nuclear explosion

Memorize the following words and expressions

along with	*вместе с, наряду с*	**to carry out**	*проводить, осуществлять*
logic gate	*логический элемент*	**prior to**	*до*
switch	*переключатель, выключатель*	**to rest on**	***зд.*** *основываться, опираться*
cathode heater	*нагреватель катода*	**capacitor**	*конденсатор, емкость*
ruggedness	***зд.*** *прочность*	**predecessor**	*предшественник*
to avoid	*избегать*	**dissipation**	*рассеяние*
reliability	*надежность*	**to determine**	*определять*
application	*применение, приложение*	**to achieve**	*достигать, добираться*
terminal	*клемма, зажим*	**due to**	*вследствие, из-за*

signal processing	*обработка сигнала*	**to fabricate**	*собирать*
gain	*коэффициент усиления*		

2.8. Read the text.

TRANSISTOR

The transistor is the key element in practically all modern electronics, and is considered by many to be one of the greatest inventions of the twentieth century. Its importance in today's society rests on its ability to be mass produced using a highly automated process (semiconductor device fabrication) that achieves astonishingly low per-transistor costs.

Although several companies each produce over a billion individually-packaged (known as discrete) transistors every year, the vast majority of transistors now produced are in integrated circuits (IC) along with diodes, resistors, capacitors and other electronic components, to produce complete electronic circuits.

The essential usefulness of a transistor comes from its ability to use a small signal applied between one pair of its terminals to control a much larger signal at another pair of terminals. This property is called gain. A transistor can control its output in proportion to the input signal, that is, act as an amplifier. From mobile phones to televisions, vast numbers of products include amplifiers for sound reproduction, radio transmission, and signal processing. Modern transistor audio amplifiers of up to a few hundred watts are common and relatively inexpensive.

Or, the transistor can be used to turn current on and off in a circuit as an electrically controlled switch, where the amount of current is determined by other circuit elements. Transistors are commonly used as electronic switches, for both high power applications including switched-mode power supplies and low power applications such as logic gates.

Prior to the development of transistors, vacuum tubes (valves) were the main active components in electronic equipment. The key advantages that have allowed transistors to replace their vacuum tubes predecessors in most applications are:

- Small size and minimal weight, allowing the development of miniaturized electronic devices.
- Highly automated manufacturing process, resulting in low per-unit cost.
- Lower possible operating voltages, making transistors suitable for small, battery-powered applications.
- No warm-up period for cathode heaters required after power application.
- Lower power dissipation and generally greater energy efficiency.
- Higher reliability and greater physical ruggedness.

- Extremely long life. Some transistorized devices have been in service for more than 30 years.
- Insensitivity to mechanical shock and vibration.

There are also some limitations in using transistors. Silicon transistors do not operate at voltages higher than above 1000 volts. In contrast, electron tubes have been developed that can be operated at tens of thousands of volts. High power, high frequency operation is better achieved in electron tubes due to improved electron mobility in a vacuum. Silicon transistors are much more sensitive than electronic tubes to an electromagnetic pulse, such as generated by an atmospheric nuclear explosion.

2.9. Read the following statements and decide if they are true (T) or false (F).

1. The transistor is one of the greatest achievements of the 19^{th} century.
2. An IC, that is, a transistor with diodes, resistors, capacitors and other electronic components is known as discrete transistor.
3. Modern transistor audio amplifiers are relatively expensive.
4. One of the advantages of a transistor over a vacuum tube is its big size and maximum weight.
5. A transistor is very stable to mechanical shock and vibration.
6. There are not any limitations in using transistors.
7. Silicon transistors are much less sensitive than electronic tubes to an electromagnetic pulse.

2.10. Complete these sentences according to the text.

1. Electron mobility is higher in … .	a. every year
2. Silicon transistors are much more sensitive than electronic tubes to …	b. in a vacuum
3.Mechatronic circuits have replaced electromechanical devices in …	c. IC
4. Over a billion of individually-packaged transistors are produced …	d. useful device
5. Transistors can be easily mass-produced using a …	e. importance in today's society
6. Very low cost of mass production is the main reason of transistor's …	f. an electromagnetic pulse
7. Transistor's flexibility and reliability has made it …	g. an equivalent mechanical control function

8. Diodes, resistors, transistors along with other electronic components form …	h. gain
9. It is easier and cheaper to use a standard microcontroller than to design …	i. controlling appliances and machinery
10. The ratio of the output signal to the input signal is called …	j. a highly automated process

2.11. Answer the questions to the text.

1. What is one of the greatest inventions of the 20th century?
2. Why is the transistor important in modern electronics?
3. How are most transistors produced now?
4. What properties have made a transistor a widespread device?
5. What devices have been replaced in controlling appliances and machinery?
6. What is the "gain"?
7. How powerful are modern transistor audio amplifiers?
8. How is the transistor used as a switch?
9. Where is this type of transistor operation (switch) common?
10. What are the key advantages of transistors?
11. Are there any disadvantages in using transistors?

GRAMMAR

Tenses of the Active Voice

2.12. Choose the right English equivalent to the Russian verb.

1. Какую статью вы *сейчас* **переводите**?
   a) translate b) is translating c) are translating
2. *Вчера в 8 часов* я **переводил** статью.
   a) translated b) had translated c) was translating
3. Сколько статей вы *уже* **перевели**?
   a) have translated b) translated c) had translated
4. Он *часто* **переводит** статьи.
   a) is translating b) translates c) translate
5. *Завтра в 7 часов* вечера я **буду переводить** статью.
   a) will translate b) will have translated c) will be translating
6. Я буду **переводить** эту статью, *когда у меня будет свободное время*.
   a) will translate b) will be translating c) will have translated

7. Что ты делал *вчера*? – **Переводил** одну статью.
   a) translated b) was translating c) have translated
8. Я уже **перевел** половину статьи *до того, как вы пришли*.
   a) had translated b) have translated c) translated
9. Обещаю **перевести** эту статью *к понедельнику*.
   a) will translate b) will be translating c) will have translated

2.13. Put the verbs in brackets into appropriate forms.

1. I usually … the experiment results. (*compare*)
2. They … text two tomorrow. (*translate*)
3. I … this article by 5 o'clock yesterday. (*read*)
4. This student … well at the last lesson. (*answer*)
5. The teacher … the new grammar rule at the last lesson. (*ask*)
6. He … you a copy of his paper by next Monday. (*send*)
7. When I came home, my sister … her report. (*prepare*)
8. What … you … tomorrow at 11 o'clock? (*do*)
9. I … just … with your group leader. (*meet*)
10. Who… he … yesterday afternoon? (*talk to*)
11. We … a test tomorrow morning. (*write*)
12. I … your letter by the end of the week. (*answer*)
13. Where is the teacher? He … a new material. (*explain*)
14. I … the article yesterday at 5 o'clock. (*translate*)
15. I … my diploma work by last week. (*finish*)
16. She … her notes for the exams now. (*revise*)
17. We … the job candidates tomorrow morning. (*interview*)
18. The students … already … credit tests. (*pass*)
19. The scientists … the solution of a problem yesterday evening (*analyze*).
20. Don't come to my place! I … . (*work*)

2.14. Translate the following sentences from Russian into English.

to take / to pass *an exam* ***– сдавать экзамен***

1. Я сдаю экзамены каждый семестр.
2. Я сдавал экзамен вчера.
3. Я буду сдавать экзамен завтра.
4. Я сдаю экзамен, не звони мне.
5. Я сдавал экзамен вчера в 10 часов утра.
6. Я буду сдавать экзамен завтра в 10 часов утра.
7. Я только что сдал экзамен.
8. Вчера к 14 часам я сдал экзамен.
9. Завтра к 14 часам я сдам экзамен.

2.15. Read and translate the following sentences paying attention to the tenses.

1. We usually take measurements with great accuracy.
2. There were many explanations of the phenomenon of light.
3. The solar energy is converting the energy of the sun rays directly into electric energy.
4. He noticed that the machine was making a noise which sounded like human voices in conversation.
5. The unit then reproduced the sounds that the diaphragm had recorded.
6. In many years of development the phonograph has developed into what we know now as the record player.
7. Industry has adapted electronic equipment to its own needs.
8. Diode consists of the filament that emits electrons and the plate that attracts electrons.
9. The voltage on the grid controls how many electrons reach the plate.
10. The discovery of this scientist did not receive due attention.
11. The invention of transistors led to an acceleration in the growth of electronics.
12. A brief review of transistor advantages will provide the answers to many questions.
13. Solid-state devices require less power than vacuum tubes.
14. The importance of this research has grown especially in connection with space research.
15. Bulky electronic equipment will be unsuitable for automation of production and transport.
16. A radio receiver assembled of micro modules does not weigh more than 50 grams.
17. These devices will give mankind invaluable assistance in different fields of life.

Unit 3. RECORDING SYSTEMS

Text A *Audio Recording Systems*
Text B *Digital Audio Player*
Grammar: **passive voice; revising tenses**

Text A

AUDIO RECORDING SYSTEMS

Pretext exercises

3.1. Read the following words and try to guess their meaning.

Theory, phonograph, model, principle, effort, message, cylinder, patent, idea, spiral, major, potential, space, collection, vinyl, analogue, laser, mechanism, mark, track, revolve, constant, reflection, converter, budget, popularity, personal.

3.2. Read the following words and notice their pronunciation.

indentation	[ˌinden`teɪʃ(ə)n]	concern	[kən`sə:n]
fidelity	[fɪ`delɪtɪ]	velocity	[vɪ`lɔsɪtɪ]
deteriorate	[dɪ`tɪərɪəreɪt]	stylus	[`staɪləs]
eliminate	[ɪ`lɪmɪneɪt]	partially	[`pɑ:ʃ(ə)lɪ]
surface	[`sə:fɪs]	modify	[`mɔdɪfaɪ]

Memorize the following words and expressions

to manufacture	*производить, изготовлять*	**to modify**	*изменять*
to concern	*касаться, иметь отношение*	**considerably**	*значительно*
to conceive	*постигать, понимать*	**to feed**	*питать, подавать энергию*
byproduct	*побочный продукт*	**entertainment**	*развлечение*
to tinfoil **tinfoil**	*покрывать фольгой металлическая фольга*	**fidelity**	*точность воспроизведения*
indentation	*вмятина, вдавливание*	**capacity**	*ёмкость, мощность, объём*
groove	*желобок, канавка, выемка*	**pattern**	*рисунок, образец, шаблон, форма*

to rotate	*вращаться*	**needle**	*игла*
velocity	*скорость, быстрота*	**laser beam**	*лазерный луч*
to deteriorate	*ухудшать, портить(ся)*	**to eliminate**	*устранять, исключать*
to reproduce	*воспроизводить*	**scratch**	*царапина*
pit	*выемка, впадина*	**despite**	*несмотря на*
to exceed	*превышать*	**to revolve**	*вращаться*
partially	*частично*		

3.3. Read the text.

AUDIO RECORDING SYSTEMS

Charles Cros, a French scientist, produced a theory concerning a phonograph, but he didn't manufacture a working model. It was Thomas Edison who produced a working model. Edison conceived the principle of recording and reproducing sound in 1877 as a byproduct of his efforts to "play back" recorded telegraph messages and to transmit them by telephone.

Edison's early phonograph recorded onto a tinfoil sheet phonograph cylinder using up-down motion of the stylus. The tinfoil sheet was wrapped around a grooved cylinder, and the sound was recorded as indentations into the foil. Edison's early patents show that he also considered the idea that sound could be recorded as a spiral onto a disc, but Edison concentrated his efforts on cylinders, since the groove on the outside of a rotating cylinder provides a constant velocity to the stylus in the groove.

Alexander Graham Bell and his two associates took Edison's tinfoil phonograph and modified it considerably to make it produce sound from wax instead of tinfoil. They began their work at Bell's Volta Laboratory in Washington, D.C., in 1879 and continued until they were granted basic patents in 1886 for recording in wax.

It took many years and further improvements before the recording industry became a major factor in home entertainment. Disk recording is neither better nor worse than cylinder recording in potential audio fidelity. But there were commercial advantages to a disk system since the disk could be easily mass produced by molding and stamping and it required less storage space for a collection of recordings.

For a long time hi-fi recordings have been produced on vinyl gramophone records. Records use an analogue recording system, which stores patterns by cutting a continuous groove in a vinyl disk. The sound can be reproduced by spinning the record and using the movement of a metal needle in the groove to produce varying magnetic fields. These magnetic fields are then processed to produce the sound. A typical LP (long-playing record) has a recording capacity of about 45 minutes.

A digital recording system, known as a compact disc (CD) system, was introduced in 1982. This uses a laser optical mechanism in which a laser beam reads marks on the surface of a specially prepared perspex disk. It gives near-perfect reproduction of sound and the sound quality does not deteriorate with use. Some of the problems associated with vinyl records are eliminated such as "crackle" caused by dust and static, and "jumping", due to scratches on the recording surface.

In a CD system, a recording is made by electronically sampling the sound 44,100 times every second. The electronic samples are used to control a laser beam, which makes a pattern of very small pits in the surface of the plastic disc. The audio pattern is represented by the length of the pits and the distance between them. The pits are arranged in circular tracks. A typical CD has about 20,000 circular tracks and a maximum recording capacity of 74 minutes.

To play back the recording, the disk is made to revolve at a constant speed and a laser beam is directed at its surface. The varying reflection of the laser beam is fed into a digital-to-analogue converter (DAC). This produces the electronic signals, which are amplified to drive a loudspeaker.

In 1989, sales of compact disks (CDs) exceeded sales of long-play albums (LPs) for the first time. By 1990, CD sales were more than double those of LPs. Cheaper CD players and the introduction of mid-price and budget-price discs have been partly responsible for the increase in CD sales.

3.4. Read the following sentences and decide if they are true (T) of false (F).

1. It was Alexander Bell who produced the first working model of a phonograph.
2. A phonograph was manufactured in 1887.
3. Edison concentrated his efforts on discs.
4. Bell produced sound from wax instead of tinfoil.
5. Recording industry became a kind of entertainment.
6. A compact disc system was introduced in 1980s.
7. A laser optical mechanism gives near-perfect reproduction of sound.
8. The quality of sound in CDs greatly deteriorate with use.
9. Crackle is not caused by dust and static.
10. Scratches on the recording surface contribute to "jumping".
11. By 1990 sales of CDs exceeded sales of LPs.
12. Cheapness of CDs is responsible for the increase in sales.

3.5. Answer the questions to the text.

1. What is Thomas Edison famous for?
2. What is a phonograph?
3. How was the sound recorded: on the foil or on the disc?
4. What did Edison concentrate his efforts on? Why?
5. How did Bell modify tinfoil phonograph?
6. What gives better audio fidelity: disc recording or cylinder recording?

7. Are there any advantages of the disc system?
8. How is the sound reproduced on vinyl records?
9. What is a recording capacity of LP record?
10. What is a digital recording system?
11. Does the sound quality of CD deteriorate with use?
12. What are the problems with vinyl records?
13. How are the pits arranged?
14. How many circular tracks are there on a CD?
15. What is a recording capacity of a CD?
16. What is DAC?
17. What is the reason for the increase in CS sales?

Text B

DIGITAL AUDIO PLAYER

Pretext exercises

3.6. Read the following words and word combinations and try to guess their meaning.

Digital, primary, store, playback, upload, download, reason, convert, feature, miniature, codec, compressed, file, rechargeable battery, user-replaceable, headphones, external, control, track, browse, button, scroll-wheel, sound level, set, temporary, permanent, select, range, contain, touch- screen, volume.

3.7. Read the following words and notice their pronunciation.

miniature	[`mınıtʃə]	install	[ın`stɔ:l]
damage	[`dæmıʤ]	announce	[ə`nauns]
environment	[ın`vaırənmənt]	commercial	[kə`mə:ʃ(ə)l]
tinnitus	[`tınıtəs], [tı`naıtəs]	sequence	[`si:kwəns]
permanent	[`pə:mənənt]	associate	[ə`səuʃıeıt]

3.8. Match the words in column A and B to make the expressions.

1. remote	a. supply
2. integrated	b. wave
3. power	c. current
4. alternating	d. line
5. radio	e. timer
6. alarm	f. clock
7. washing	g. control
8. clock	h. circuit
9. assembly	i. diode
10. germanium	j. machine

Memorize the following words and expressions

to refer to as	*называться*	**digital sampling**	*цифровая выборка, дискретизация*
consumer	*потребитель, покупатель*	**sequence**	*последовательность*
portable	*переносной, портативный*	**embedded processor**	*встроенный процессор*
support	*поддержка*	**jack**	*гнездо, розетка, пружинный переключатель*
to announce	*объявлять*	**to skip**	*перепрыгивать, перескакивать*
attendant	*сопутствующий*	**to provide**	*обеспечивать, снабжать, давать*
to spread	*распространять(ся)*	**quality**	*качество*
to install	*устанавливать*	**suitable**	*подходящий*
handset	*телефонная трубка, мобильная трубка*	**hearing damage**	*нарушение слуха*
stand-alone	*автономный*	**to put at risk**	*рисковать*
codec	*кодер, декодер, алгоритмы уплотнения, разуплотнения данных*	**tinnitus**	*шум в ушах*

3.9. Read the text.

DIGITAL AUDIO PLAYER

A digital audio player, or DAP, usually referred to as an MP3 player, is a consumer electronic device that has the primary function of storing, organizing and playing audio files. Some DAPs are also referred to as portable media players as they have image-viewing and/or video-playing support.

The immediate predecessor in the market place of the digital audio player was the portable CD player. Kane Kramer designed one of the earliest digital audio players which was capable of approximately 3.5 minutes of audio playback but it didn't enter commercial production. The world's first company to announce a portable MP3 player and the attendant system for uploading MP3 audio content to a personal computer and then downloading it onto a personal MP3 player was Audio Highway in1996.

The next company on the MP3 player scene was South Korea-based Saehan Information Systems which began selling its "MPMan" player in the middle of 1998. In 2001 the first MP3 players were installed into mobile phones in South Korea and the first artist to sell songs as MP3 file downloads directly to mobile phones was Ricky Martin. The innovation spread rapidly and by 2005, more than half of all music sold in South Korea was sold directly to mobile phones. The idea spread across the globe and by 2005 all five major handset makers, Nokia, Motorola, Samsung, LG and SonyEricsson had released musicphones. By 2006, more MP3 players were sold in musicphones than all stand-alone MP3 players put together. The rapid rise of the musicphone was a primary reason for developing iPhone. Today more than half of all mobile phones in the world have an MP3 player.

Digital sampling is used to convert an audio wave to a sequence of binary numbers that can be stored in a digital format, such as MP3. Common features of all MP3 players are a memory storage device, such as flash memory or a miniature hard disk drive, an embedded processor and an audio codec microchip to convert the compressed file into an analogue sound signal.

Most DAPs are powered by rechargeable batteries, some of which are not user-replaceable. They have a 3.5 mm stereo jack; music can be listened to with headphones, or played via an external amplifier. Nearly every DAP consists of some kind of display screen and a set of controls with which the user can browse through the library of music contained in the device, select a track, and play it back. The controls can range from the simple buttons as are found on most typical CD players for skipping through tracks or stopping/starting playback to full touch-screen controls. One of the more common methods of control is some type of the scroll wheel with associated buttons.

Content is placed on DAPs typically through a process called "syncing", by connecting the device to a personal computer, typically via USB, and running any special software that is often provided with the DAP on an enclosed CD-ROM, or downloaded from the manufacturer's website. The music, or other content such as TV episodes or movies, is added to the software to create a "library". The library is then "synced" to the DAP via the software. Many players have a built-in microphone which allows recording. Usually recording quality is poor, suitable for speech but not music.

The risk of hearing damage from digital audio players depends on both sound level and listening time. The listening habits of most users are unlikely to cause hearing loss, but some people are putting their hearing at risk, because they set the volume control very high or listen to music at high levels for many hours per day. Such listening habits may result in temporary or permanent hearing loss, tinnitus, and difficulties understanding speech in noisy environments.

3.10. Choose the correct variant and complete the following sentences.

1. The first person who designed the earliest digital audio player was
a) Ricky Martin
b) Kane Kramer
c) A.Bell

2. By 2006 most MP3 players were sold as
a) stand-alone
b) musicphones
c) iPhones

3. The most serious hearing damage caused by audio players is:
a) hearing loss
b) difficulties understanding speech in noisy environments
c) tinnitus

4. DAP is connected to a personal computer via
a) CD-ROM
b) USB
c) cable

5. Most DAPs are powered by
a) external amplifiers
b) jack
c) rechargeable batteries

3.11. Match the English terms with Russian definitions.

1. Digital sampling	a. цифровой аудиоплеер
2. CD-ROM	b. цифровая выборка, дискретизация
3. USB	c. компакт диск, доступный только для чтения
4. DAP	d. универсальная последовательная шина

3.12. Read the following sentences and say whether they are true (T) or false (F).

1. The primary function of DAPs is video recording files.
2. The first company to release MP3 player was South Korean Saehan Information Systems.
3. The first artist to use a mobile phone was Ricky Martin.
4. All mobile phones today have MP3 players.
5. Buttons are used to ship through tracks or stopping/starting playback.
6. Every MP3 player is powered by replaceable rechargeable batteries.
7. Software for DAP is always downloaded from the manufacturer's website.
8. Library of content is provided by the manufacturer.
9. Sound level of MP3 does not damage hearing at all.
10. Tinnitus is caused by bad listening habits.

3.13. Answer the questions to the text.

1. What is the primary function of MP3 player?
2. Why are some DAPs called portable media players?
3. What device was the immediate predecessor of the digital audio player?
4. How long was playback of Kane Kramer's player?
5. What was the first company to announce a portable MP3 player?
6. Who was the first artist to sell songs as MP3 player file downloads to mobile phones?
7. What was the primary reason for developing iPhone?
8. What is "digital sampling" used for?
9. What are the common features of MP3 players?
10. What is the most common method of control in DAPs?
11. How is special software for DAP provided?
12. How is the library created?
13. What does the risk of hearing damage depend on?
14. What can you do to choose necessary track to listen to?

GRAMMAR

Passive Voice

3.14. Read and translate the following sentences paying attention to the tenses.

1. Crystal valves **were known** long before the invention of vacuum tubes.
2. They **were all made** from materials which we now classify as semiconductors.
3. Vacuum tubes **are still widely used.**
4. Electrons **are attached** to a positively charged electrode.
5. Vacuum tubes **are classified** according to the number of electrodes.
6. The action of these devices **was not understood.**
7. These semiconductor devices **were used** as rectifiers.
8. An interesting research **had been done** before they got the better results.
9. The applicants with the best scores **are selected** for an interview.
10. The speed with which arithmetic operations **are performed is affected** by a number of factors.
11. Many materials now commonly used **were not** even **thought of** thirty years ago.
12. Some important issues **have not** yet **been resolved.**
13. High frequency operation **is** better **achieved** in electronic tubes.
14. This invention **was** much **written about** at that time.
15. A lecture **was attended** by a great number of students.
16. The lecture **will be followed by** a discussion.
17. Final examinations **are taken** at the end of the course.

18. A new production plan **will be discussed** at the meeting.
19. A few illustrative examples **have** just **been given**.
20. An analysis of the data **will have been made** by next Monday.

3.15. Put a verb in brackets into appropriate form.

1. A sequence of binary numbers can … in a digital format.(*store*)
2. Digital audio players (DAPs) … by rechargeable batteries. (*power*)
3. Recording … also … in many players that have a built-in microphone. (*allow*)
4. Hearing loss can … both by sound level or listening time. (cause)
5. In 2001 the first MP3 players … into mobile phones in South Korea. (*install*)
6. In 2005 half of all music sold in Korea … directly to mobile phones. (*sell*)
7. Unfortunately before we make the experiment, their work … (*publish*).
8. The title of the article … . (*change*)
9. The results … by the presence of impurities. (*affect*)
10. This problem can … from several points of view. (*approach*)
11. These parts … of steel throughout. (*make*)
12. These requirements must … . (*meet*)
13. The intellect … into action. (involve)
14. Resistors … with coloured bands to ease the problem of making such small components. (*code*)
15. The values … above. (*show*)
16. The tuner … to the detector. (*connect*)
17. Microprocessors … now … to control many household items such as automatic washing machines, dishwashers, sewing machines and food processors. (*use*)
18. Electronic timers … in digital clocks, water heaters, electric cookers and microwave ovens. (*find*)

Revising Tenses

3.16. Choose the right variant and complete the following sentences.

1. The experiment … by testing the end product.
   a) will be followed b) will follow c) will have followed
2. The transistor can … to turn current on and off in a circuit.
   a) are used b) use c) be used
3. Vacuum tubes … as the main active components in electronic equipment.
   a) were used b) was used c) are used
4. By the end of March the project … .
   a) will have been realized b) will be realized c) is being realized
5. Great success … in space research.
   a) have been achieved b) has been achieved c) has achieved
6. The students … their laboratory work now.
   a) have done b) are doing c) are being done

7. The project … by the end of the month.
a) will finish b) will have been finished c) will be finishing

8. Programming languages initially … by people in universities or in the government.
a) were created b) had created c) has been created

9. Most computer crimes … by accident.
a) discover b) is discovered c) are discovered

10. Public interest in the electric vehicle … higher by now.
a) become b) became c) has become

3.17. Put the verbs in brackets into appropriate forms, active or passive.

1. The discovery of electron … to a revolution in electrical science.(*lead*)
2. Electronics … to appearance of television, sound pictures and long-distance calls. (*contribute*)
3. Until 1955 vacuum tubes … the principle building blocks of electronic circuits (*be*).
4. Vacuum tubes … still widely … in oscilloscopes. (*use*)
5. Crystal valves … long before the invention of vacuum tubes. (*know*)
6. In 1948 American scientists … the first transistor. (*invent*)
7. Solid-state devices … the growth of electronics. (*accelerate*)
8. Transistors … from parts which do not wear out. (*make*)
9. Transistors … very little power. (*waste*)
10. The students … a problem they had to solve. (*give*)
11. The laboratories our students work in … with the best equipment. (*provide*)
12. The substance … in detail by the engineer in two months' time. (*study*)
13. The facts you … about illustrate the use of generators.(*tell*)
14. The translation … yet. (*finish*). It … by the end of the month. (*finish*)
15. This question … yesterday. (*discuss*)
16. The electronic industry … several types of microcomputers. (*produce*)
17. The air in many cities … by traffic and industry. (*pollute*)
18. Our technological advances … to deal with the most difficult problems. (*allow*)
19. Who … the electric lamp? (*invent*)
20. The consumption of electricity … every ten years. (*double*)
21. An audio codec microchip … the compressed file into an analogue sound signal. (*convert*)
22. Axioms … no proof but theorems do. (*require*)
23. Several factors … the quality of broadcast signal. (*affect*)
24. Last summer we … a plant producing washing machines. (*visit*)

Unit 4. TELEVISION

Text A *Television*
Text B *Robots*

Grammar: attribute group,
complex sentences

Text A

TEVEVISION

Pretext exercises

4.1. Read the words and try to guess their meaning.

Product, action, underwater, production, magazine, system, satellite, cable, communication, channel, show, display, calculator, code, detailed, visual, format, occupy, stage, manufacturer.

4.2. Read the following words and notice their pronunciation.

fair	[fɛə]	assembly	[ə`semblı]
surprising	[sə`praızıŋ]	influence	[`ınfluəns]
launching	[`lɔ:ntʃıŋ]	occur	[ə`kə:]
boundary	[`baundərı]	artificial	[ˌɑ:tı`fıʃəl]
satellite	[`sætəlaıt]	convenient	[kən`vi:nıənt]
rural	[`ruərəl]	announce	[ə`nauns]
colour	[kʌlə]	liquid	[`lıkwıd]
weigh	[weı]	major	[`meıʤə]
digital	[`dıʤıtəl]	brightness	[`braıtnəs]
automatically	[ˌɔ:tə`mætıkəlı]	simultaneously	[ˌsıməl`teınıəslı]
occupy	[`ɔkjupaı]		

4.3. Translate the following groups of words into English.

Система автоматического управления, ток проводимости, генератор с отрицательной сеткой, звуковой сигнал промежуточной частоты, импульсный генератор, генератор кода времени, малошумящий усилитель, пучок заряженных частиц, камера цветного телевизора, автоматическая регулировка частоты, прибор с отрицательным сопротивлением, частота излучения лазера, лазер с обратной связью, генератор с цифровым управлением.

Memorize the following words and expressions

set	*прибор, устройство*	**colour**	*цветной*
assembly	*монтаж, сборка; агрегат*	**to switch**	*переключать*
direct	*прямой*	**to occupy**	*занимать*
directly	*прямо, непосредственно*	**to define**	*определять*
to appear	*появляться*	**definition**	*определение*
to disappear	*исчезать*	**high-definition TV**	*телевидение высокой четкости*
to provide	*снабжать, обеспечивать*	**to manufacture**	*производить, создавать*
to solve	*решать*	**to increase**	*увеличивать, повышать*
solution	*решение*	**to decrease**	*понижать, уменьшать*
to replace	*заменять, замещать*	**ratio**	*отношение, коэффициент*
digital	*цифровой*	**flat**	*плоский*
bright	*яркий*	**light**	*свет*

4.4. Read the text.

TEVEVISION

The television set is evidently the most important and popular electronic product of all time. All homes in developed countries have one or more TV sets and in many countries there are considerably more TV sets than telephones.

But in 1939 at the World's Fair in New York a tiny nine-by-twelve inch box was the centre of attention for hundreds of people. They were the first to see a television set in action. Compared to today's TV shows of underwater and outer-space research, those first black-white pictures were not very good. The pictures were only transmitted from one side of the Fair territory to the other. But in 1939 they were of historical importance.

When World War II broke out electronic factories that began the TV production stopped making them and started making war materials instead. When the war over, TV sets began coming off factory assembly lines. By 1958 there were millions of them.

At present TV communication is provided with the help of a system of artificial earth satellites so that people living in different parts of the country and all over the world and in different time zones are able to watch the central TV programs at the most convenient hours.

Nowadays many countries also have cable TV, a system using wires for the transmission of television programs. Cable television first appeared in 1949 as a means of transmitting TV signals to rural and mountain areas far from big cities. Cable television's next big step forward was made by the middle 1980s. Scientists announced that many technical problems had been solved and in the future it would be possible via satellite and cable TV to use more channels on a TV set at every home in the world.

A few years ago it became evident that the next major advance for TV would be digital television. In a digital system the usual continuous signal is replaced by a digital code containing detailed information on brightness, colour, etc. A digital TV set hangs on the wall like a picture. Essentially, it is a minicomputer with a visual display. Once a week you put the programs you like into the memory, and the TV set will automatically switch on the desired channel at the right time. You can watch several programs simultaneously on miniscreens and then produce one of them in full format. Also, the TV set can automatically video-record the programs when you are absent or occupied.

By the end of 1980s television has moved to a new and the most important stage in its development since the appearance of colour television. Technically it is called high-definition television (HDTV) or Hi-Vision. This is the much higher resolution television of the 21st century. The new system increases the screen's width-to-height ratio (16:9). The result is a picture several times sharper than in the existing TV sets. Besides, recent developments in plasma display panel technology make HDTV commercially practicable. The plasma display makes it possible to produce a large, bright, colour, flat TV screen so thin and light that it can also be hung on a wall like a framed picture. The engineering problem that has existed almost since the first days of television may be solved now.

4.5. Read the following statements and decide if they are true (T) or false (F).

1. The first black-and-white pictures were not of very high quality.
2. The TV production during World War II was of great importance.
3. Today people living in central parts of the country can watch only central TV programs.
4. A cable TV system uses wires for the transmission of television programs.
5. Digital TV is replaced by cable television.
6. It will be possible to watch several programs at the same time.
7. Hi-Vision is a new video system that makes a traditional picture.

4.6. Answer the questions to the text.

1. When did the first TV set appear?
2. Were people interested in the new invention? Why?
3. What distance were the first pictures transmitted?
4. Why was the TV production stopped in 1940?
5. What is the role of the artificial earth satellite?
6. What is cable television?
7. What is the functioning of digital television based on?
8. Have you ever video-recorded the TV program?
9. What did Japanese manufacturers develop?
10. What is the importance of HDTV?

4.7. Topics for discussion.

1. History of television.
2. The role of television in people's life.
3. Your favourite TV programs.
4. Different kinds of television.

Text B

ROBOTS

Pretext exercises

4.8. Read the following words and expressions and try to guess their meaning.

Origin, robot, play, train, machine, individuality, parody, satire, humanity, figure, form, hero, cartoon, superhuman, industrial robot, process, intelligent, micro-computer, automatically controlled industrial manipulators, characteristic, action, manual, generation, elementary senses, touch, reaction, distance, object, mechanical superman, component, factory, cement, spray, list, space project, productivity, electronic parts, install chips, video camera, sensing device.

4.9. Read the following words and notice their pronunciation.

origin	[`ɔrɪʤɪn]	tactile	[`tæktaɪl]
familiar	[fə`mɪlɪə]	possess	[pə`zəs]
exhibit	[eg`ɪbɪt]	sight	[saɪt]
manipulator	[mə`nɪpjuleɪtə]	breathe	[briːθ]
forge	[fɔːʤ]	social	[`səuʃ(ə)l]

Memorize the following words and expressions

outskirts	*пригород*	**to possess**	*обладать*
to come into being	*войти в обиход*	**to carry out a decision**	*принимать решение*
familiar figure	*знакомая фигура, очертание*	**to weld**	*сваривать*
mechanical-driven doll	*механически управляемая кукла*	**printed circuit board**	*печатная плата*
to exhibit	*демонстрировать*	**accuracy**	*точность*
generation	*поколение*	**texture**	*текстура*
rigid oft-repeated program	*фиксированная часто повторяющаяся программа*	**underwater exploration research**	*подводные исследования*
to belong to	*принадлежать*	**accident**	*несчастный случай*

4.10. Read the text.

ROBOTS

The origin of the word “robot” is said to have appeared first in a play called RUR (Rossum’s Universal Robots) written by a Chech playwight, Karel Čapec. Men riding on a fully-packed train in the outskirts of Prague were just like machines lacking in individuality, Čapec. called such men robots in his play by parodying the word ‘robota’ meaning slave labour. The word ‘robot’ came into being by the bitter satire of the condition of man who was deprived of his humanity and became like a machine.

For years robots have been quite familiar figures in our minds in the form of mechanical-driven dolls, or the heroes in children’s cartoons who exhibit superhuman qualities. However, the image of industrial robot used in manufacturing processes is far different from such. Among industrial robots, there are different types ranging from hand-operated “magic hands” to others equipped with intelligent faculties by incorporating micro-computers. Hence, there is no clear-cut definition for industrial robots.

The automatically controlled industrial manipulators are divided into three generations: programmed, adaptive and intellectual. Characteristic of the first generation – the programmed robots – is that their control system acts according to a rigid oft-repeated programme all the time. But the programmed robot ia easily

retuned to various action programmes. All the industrial robots in stamping, mechanical processing, forge and foundry work, and in other auxiliary "manual" operations as well as in loading and unloading that have been widely introduced belong to this generation. They will continue to be the main type of robot.

Adaptive robots, or robots of the second generation, are being developed along with them. Where they differ is that they possess the most elementary senses in their manipulators – tactile (sense and touch), power (reaction to the magnitude of the work effort), locating (reaction to the distance to the object and the speed of approaching it), and light (reaction to the object located within a beam of light), and subsequently microprocess the information.

The third generation – the intellectual robots – possesses far richer means for sensing (including sight), for processing information with a view and carrying out a decision. It enables us to say that the robot possess "artificial intellect".

Many of the robots in use today do jobs that are especially difficult for human workers. These are the types of jobs that require great strength or pose danger. For example, robots are particularly useful in the auto-manufacturing industry where parts of automobiles must be welded together. As mechanical supermen, robots may do anything from moving heavy components between workstations on a factory floor to carrying bags of cement.

Spray painting is another task suited to robots because robots do not need to breathe. Unlike human painters, they are unaffected by the poisonous fumes. Third in the list of useful jobs for robots is the assembly of electronic parts. Robots shine at installing chips in printed circuit boards because of a capability that robots have that people don't. Their automatic accuracy is particularly valuable in this kind of industry because locating and fixing mistakes is costly.

Robots that are fitted with video cameras and other sensing devices can detect heat, texture, size and sound. These robots are used in space projects, nuclear reactor stations, and underwater exploration research.

The use of industrial robots has produced a number of economic and social advantages. Among them are the improvement in productivity, greater humanization of working life, prevention of labour accidents, improvement of product quality and the development of new industries.

4.11. Arrange these sentences in order to make a logical paragraph paying attention to the dates.

1. In 1954, the American inventor George Devol began work that eventually led to the industrial robot as we know it today.
2. Between 1967 and 1969, researchers at the Stanford Research Institute in the United States developed a robot with wheels named Shakey.
3. Since then, many companies have entered the robotics market.
4. This was because it could only be controlled by a separate mainframe computer, which sent its commands to the robot through a radio channel.

5. All three helped Shakey to move freely and avoid obstacles.
6. Later devices were more successful – for example, a four-legged robot developed at the Tokyo Institute of Technology in 1980.
7. In 1983, a six-legged robot was developed by Odetics Incorporated, for commercial production.
8. This system combined a human controller with automatic processing of information about the terrain, right down to the foot movements needed to ensure smooth movement.
9. Shakey was fitted with bump detectors, a sonar range finder, and a TV camera.
10. This was an extremely difficult job for the driver, and the machine regularly became unbalanced and fell over.
11. A battery-powered model, Odex 1, used a radio channel for leg control and a video link for conveying images.
12. Shakey was thought to be a failure.
13. This machine could walk over obstacles and lift loads several times its own weight.
14. The machine carried a human operator who had to control each of the four legs.
15. In 1967, the General Electric Corporation (GEC) had developed a four-wheeled machine for the US Department of Defense.
16. The next important step was the development of robots with legs.

4.12. Answer the questions to the text.

1. What is the origin of the word “robot”?
2. How did robots look like for many years?
3. Is there an exact definition of the word “robot”?
4. How many generations of industrial manipulators are there?
5. What generation do industrial robots which are used in stamping belong to?
6. What types of jobs do the robots do?
7. Why is spray painting suited to robots?
8. Why are robots particularly valuable in assembly of electronic parts?
9. What robots are used in space projects?
10. What advantages has the use of industrial robots produced?

4.13. Discuss the following.

1. Different types of industrial robots and their application.
2. Robots today and tomorrow.
3. Types of jobs suitable for robots.
4. Robots in space exploration.
5. Robots in military service.

GRAMMAR

Attribute group

4.14. Read and translate the following groups of words.

Energy spectrum, light pulse, copper wire, potential difference, flicker noise, frequency band, charge distribution, power gain, discrete-circuit design, feedback laser, ice thickness measurement, low-power TV transmitter, radar ice probe, large-scale integrated circuit, direct electrode voltage, displaced phase centre antenna, transmission distortion measuring set.

4.15. Choose the right variant.

1. Automatic frequency correction
   a) автоматическая частота коррекции
   b) коррекция автоматической частоты
   c) автоматическая коррекция частоты

2. Parallel-feed amplifier
   a) усилитель с параллельным питанием
   b) параллельное питание усилителя
   c) параллельный усилитель с питанием

3. Transistor equivalent circuit
   a) транзистор эквивалентной схемы
   b) эквивалентная схема транзистора
   c) транзистор с эквивалентной схемой

4. Automatic gain control
   a) автоматическая регулировка усиления
   b) усиление с автоматической регулировкой
   c) регулировка автоматического усиления

5. Integrated-circuit electron device
   a) интегральная схема электронного прибора
   b) прибор с интегральной схемой
   c) электронный прибор на интегральной схеме

6. Temperature compensated oscillator
   a) температурная компенсация генератора
   b) генератор с температурной компенсацией
   c) компенсация температуры генератора

7. Automatic data processing system
    a) автоматическая система обработки данных
    b) система автоматической обработки данных
    c) автоматическая обработка данных системы

Complex sentences

4.16. Read and translate the following sentences paying attention to the subordinate clauses.

1. We know our scientists have achieved great success in the development of electrical engineering.
2. Radio waves our students will study propagate at a great speed.
3. We know the warm air rises and the cooler air takes its place.
4. The facts you have been given above are an attempt to illustrate this phenomenon.
5. From this article we learned the hydrogen atom is the simplest.
6. The antenna we are speaking about is mounted on the airplane.
7. The laboratory he works in carried out an important research.
8. The report he made after their delegation had visited our plant shows he has finally realized the importance of the work we are doing here.
9. Associations will organize numerous meeting devoted to the part our state has played in the progress of modern society.
10. The most important effect the Moon has on the Earth is the production of the tides.
11. The local station is broadcasting the news I have already heard today.
12. The principles Ford used to make Model T are used in motor manufacturing up to now.
13. For a long time Bell couldn't get the results he was looking for.
14. The problem this article deals with is connected with subject we study.
15. It is difficult to imagine the world we live in without radio, television and telephone.
16. The new methods of research the engineers had used at the plant greatly improved their work.
17. It was stated the conclusion was correct.
18. Materials new computers depend on must be of the best quality.
19. The number of components supercomputers consist of is great.
20. The laboratory the Curies worked in was very primitive.
21. Satellites our communication goes through are sent into space regularly.
22. The problem Bell was interested in was not an easy one and it took several years to solve it.
23. The changes and movements of the air we are surrounded with influence our life.
24. This is an article that deals with some environmental problems we face.
25. This is the principle the mercury thermometer is based on.

4.17. Read and translate the following sentences paying attention to the conditional clauses.

1. If light is cut off, the flow of electrons from the cathode stops and the current is reduced to zero.
2. If sufficient heat is applied for a long period of time, the electrons will leave the metal and fly off into space.
3. Let us picture what would happen if there were a conducting wire between two points of unequal potential.
4. The force of the Earth gravitation will decrease provided the distance from the Earth increases.
5. Were I in your place I would act differently.
6. If you had arranged the equipment the way you were told, the results of the work would have been much better.
7. Provided all the requirements were met, the efficiency of the apparatus would be increased.
8. If you classified the data, fewer tests would be needed.
9. If he had been able to get all the books on that subject, his report would have been much better.
10. Had you taken all the safety measures, the machine would not have been broken.
11. The measurements were always correct provided the necessary instruments were used.
12. If they had completed their research, the results would have been discussed at the conference.
13. The manned spaceships could not have been launched into space unless the scientists had studied the information received from the space satellites.
14. Had you applied your theoretical knowledge to your practical work, you would have got a different result.
15. Had he used new materials, the device would have been more reliable.
16. Provided new composite materials are used, it will be possible to reduce overall aircraft weight.
17. An aircraft pilot can get all the information he needs provided he contacts a radio navigation station.
18. Having measured the distance between two points, it is possible to calculate the time during which a car can cover it provided we know the car's average speed.
19. Space flights would be impossible unless special materials for space vehicles were produced.
20. It would have been impossible to send satellites into orbit unless Newton's laws of motion had been studied.
21. Many accidents could have been prevented had the principles of physics been known and properly applied.
22. Ultra-violet rays would be dangerous to people only if they acted during sufficiently long periods of time.

Unit 5. INTEGRATED CIRCUITS

Text A	***Integrated Circuits***
Text B	***Cellphones***
Grammar:	**participle**

Text A

INTEGRATED CIRCUITS

Pretext exercises

5.1. Read the following words and expressions and try to guess their meaning.

Electronics, microchip, passive, components, integration, manual, discrete, photolithography, contain, term, economically, reflect, combination, vertically, horizontally, microwave, silicon.

5.2. Read the following words and notice their pronunciation.

substrate	[`sʌb.streɪt]	approach	[ə`prəutʃ]
enormous	[ɪ`nɔ:məs]	notably	[`nəutəblɪ]
guidance	[`gaɪdəns]	advance	[əd`vɑ:ns]
propose	[prə`pəuz]	initiated	[ɪ`nɪʃɪeɪtɪd]
entire	[ɪn`taɪə]	supercomputer	[`su:pəkəm.pju:tə]

Memorize the following words and expressions

electronics	*электроника*	**die**	*кристалл*
to consist of	*состоять из*	**to consume**	*потреблять*
as well as	*также как*	**close together**	*сжатый, без пропусков*
surface	*поверхность*	**to denote**	*означать, обозначать*
substrate	*подложка*	**crucial**	*решающий, критический*
tiny	*крошечный, маленький*	**guidance system**	*система-путеводитель, система управления*
enormous	*громадный, огромный*	**circuit board**	*печатная плата*

assembly	*монтаж, сборка, компоновка*	**growth**	*рост*
performance	*работа, производительность, характеристика*	**entire**	*весь, полный, целый*
furthermore	*более того*	**notably**	*исключительно, особенно*

5.3. Read the text.

INTEGRATED CIRCUITS

In electronics, an integrated circuit is a miniaturized electronic circuit consisting mainly of semiconductor devices, as well as passive components that have been manufactured on the surface of a thin substrate of semiconductor material. The integration of large numbers of tiny transistors, diodes, resistors and capacitors into a small chip was an enormous improvement over the manual assembly of circuits using electronic components. The integrated circuit's mass production capability, reliability, and building-block approach to circuit design ensured the rapid adoption of standardized ICs in place of designs using discrete transistors.

There are two main advantages of ICs over discrete circuits: cost and performance. Cost is low because the chips, with all their components, are printed as a unit by photolithography and not constructed one transistor at a time. Furthermore, much less material is used to construct a circuit as a packaged IC die than as a discrete circuit. Performance is high since the components switch quickly and consume little power because the components are small and close together.

The first integrated circuits contained only a few transistors. The term "Small-Scale Integration" (SSI) was used to denote them. SSI circuits were crucial to early aerospace projects in 1960s as Apollo program needed lightweight digital computers for their guidance systems.

The next step in the development of integrated circuits, taken in the late 1960s, introduced devices which contained hundreds of transistors on each chip called "Medium-Scale Integration" (MSI). They were attractive economically because while they cost little more to produce than SSI devices, they allowed more complex systems to be produced using smaller circuit boards, less assembly work and a number of other advantages.

Further development led to "Large-Scale Integration" (LSI) in the mid 1970s, with tens of thousands of transistors per chip.

The final step in the development process, starting in the 1980s and continuing through the present, was "Very Large-Scale Integration" (VLSI). To reflect further growth of complexity, the term *ULSI* that stands for "Ultra-Large-Scale Integration" was proposed for chips of complexity of more than 1 million transistors.

Wafer-scale integration (WSI) is a system of building very large integrated circuits that uses an entire silicon wafer to produce a single "super-chip". Through a combination of large size and reduced packaging, WSI could lead to dramatically reduced costs for some systems, notably massively parallel supercomputers.

A system-on-a-chip (SOC) is an integrated circuit in which all the components needed for a computer are included on a single chip. A three-dimensional integrated circuit (3D-IC) has two or more layers of active electronic components that are integrated both vertically and horizontally into a single circuit. Among the most advanced are the microprocessors or cores, which control everything from computers to cellular phones to digital microwave ovens.

Only half a century after their development was initiated, integrated circuits have become useful. That is, modern computing, communication, manufacturing and transport systems, including the Internet, all depend on the existence of integrated circuits.

5.4. Use the expressions from the box and complete the following sentences.

photolithography power performance capability lightweight useful cores complexity microprocessors layers substrate

1. Semiconductor devices, as well as passive components, are manufactured on the surface of a thin … of semiconductor material.
2. The rapid adoption of standardized ICs was due to its mass production ….
3. An IC is printed as a unit by ….
4. … is high since the components switch fast and consume little ….
5. SSI circuits were crucial to aerospace projects as they needed … digital computers for their guidance systems.
6. A three-dimensional integrated circuit has two or more … of active electronic components on a single circuit.
7. Microwaves are controlled by ….
8. Integrated circuits have become … for the last 50 years.
9. The term ULSI is used to denote chips of … of more than 1ml transistors.
10. The most advanced are … which control everything.

5.5. Complete the table.

Time period	Scale of integration	Number of transistors per chip
1960s	SSI	a few
…	…	hundreds of transistors
mid 1970s		…
…	VLSI	…
…	…	over a million

5.6. Answer the questions to the text.

1. What is an IC?
2. What material is the substrate of IC made of?
3. How were transistors assembled earlier?
4. What ensured the rapid adoption of ICs?
5. What are the main advantages of ICs over discrete circuits?
6. Why is the performance of IC high?
7. How many transistors were used in SSI?
8. How is an IC with tens of thousands of transistors per chip called ?
9. How are the layers of active components integrated in 3D-ICs?
10. What does modern computing depend on?

Text B

CELLPHONES

Pretext exercises

5.7. Read the following words and expressions and try to guess their meaning.

Communication, aeroplane, mobile phone, service, system, control base station, message, relay, controller, fixed, type, limit, user, network, portable, transmit, call, hexagonal-shaped cell, channel, interference, output power, cluster, car park, permanently, select, register, position, signal, contact, check, tune, constantly, monitor, prevent, reduce, test, switch, silence.

5.8. Read the following words and notice their pronunciation.

emergency	[ɪ`mə:ʤənsɪ]	interference	[ˌɪntəɛ`fɪərəns]
available	[ə`veɪləbl]	compromise	[`kɔmprəmaɪz]
lightweight	[`laɪtweɪt]	permanently	[`pə:mənəntlɪ]
portable	[`pɔ:təbl]	automatically	[ˌɔ:tə`mætɪkəlɪ]
cellular	[`seljulə]	neighbouring	[`neɪbərɪŋ]

Memorize the following words and expressions

emergency service	*аварийная служба*	**to vary**	*меняться, разнообразить*
to relay	*передавать*	**interference**	*интерференция, взаимное влияние, помехи*
within	*в пределах, в рамках*	**to depend on**	*зависеть от*

lack	*недостаток, отсутствие*	**compromise**	*компромисс*
to overcome	*преодолевать, превозмочь*	**cluster**	*группа, блок, совокупность, пакет*
lightweight	*легкий*	**public telephone exchange**	*телефонная станция общего пользования*
transceiver	*приемопередатчик*	**register**	*журнал записей, реестр*
hexagonal	*шестиугольный*	**to page**	***зд. глагол*** *сопровождать*
to allocate	*предназначать, резервировать*	**signal strength**	*уровень сигнала*

5.9. Read the text.

CELLPHONES

Radiophones, using the VHF band, were developed during the Second World War to provide communications for ships and aeroplanes. At the end of the war they were further developed as mobile phones for use by the emergency services and other services such as taxis.

With mobile phone systems, all communications take place through a central control base station. Mobile units normally do not communicate directly with other mobile units. They send messages to the control base station and the base station controller relays the messages to the other mobile units. Although mobile phones can be moved, they must stay within fixed areas. This type of system is limited by the fact that there are not enough VHF frequencies available for large numbers of communications between individual users.

The problem of a lack of suitable frequencies can be overcome by using a cellphone network. A cellular phone (cellphone) is a lightweight, portable radio transceiver which can transmit and receive telephone calls anywhere in the cellular network area. In the network, the same frequencies can be used for many different telephone calls at the same time. To achieve this, each communications area is divided into a number of hexagonal-shaped cells.

Each cell is allocated a number of frequency channels for communications. Although the frequencies used in any one cell are not used in its neighbouring cells, the same frequencies can be used in cells further away without causing interference. The size of the cells varies from 1 km to about 30 km across, depending on the output power of the cellphone transmitters. Each area can have a different number of cells, but a cluster of seven cells gives a good compromise between the number of frequency

channels available in each cell and the interference between communications in different cells.

Each cell has a small electronic base station situated in a public place such as a car park or shopping centre. All the base stations for a cluster of cells are permanently connected to a main switching centre (MSC). This contains a computer to select suitable frequencies and control the communications for that cluster of cells. The MSC is also connected to other MSCs and to the public telephone exchange, allowing cellphones to make calls or receive calls from other cellphones and fixed telephones thoughout the whole telephone system.

The MSC keeps a register of cellphones indicating their cell position. If the cellphone moves to another cell, its new position is signalled to the MSC. In this way, the MSC knows where to send signals to contact each cellphone. When a call is made to a cellphone, the MSC first checks the registrations to find the position of the cellphone. It then pages the cellphone and causes it to tune to the allocated frequency channel. The cellphone then begins sending an 8 kHz signal to the base station. When the user takes the call, the 8 kHz signal is discontinued and the speech channel is enabled.

The base station constantly monitors the signal level of a call. If the signal level becomes too strong, it will cause interference to other users. To prevent this, the power level of the cellphone is automatically reduced. If the signal level becomes too weak, the MSC tests the signal strength from neighbouring base stations and switches the call to another base station and speech channel if necessary. This may cause a period of silence of up to about 400 ms while the switching takes place.

5.10. Read the text and say which paragraph deals with the following:

a) cellphone networks;
b) how signal levels are controlled;
c) how the MSC locates a cellphone;
d) limitations of mobile phone systems;
e) frequency distribution within cells and clusters;
f) the development of mobile phones;
g) how cellphones link with other cellphones and with the telephone system.

5.11. Match the beginnings and ends of the following sentences.

1. Mobile phones using the VHF band were developed for use by …	a) limitations
2. Mobile phone systems work through a …	b) emergency services.
3. The lack of VHF bands for large numbers of individual users is the main reason for … of mobile units.	c) cellular network area.
4. The same frequencies can be used for a large number of calls at the same time in the …	d) transmitters
5. The size of the cells varies depending on the output power of the cellphone …	e) central control base station

6.MSC is connected to other MSCs and to the … giving opportunity to make and receive calls via cellphones and fixed phones.	f) speech channel
7. MSC first checks the registrations to find the position of the …	g) public telephone exchange
8. When the user takes the call, the 8 kHz signal is discontinued and the … is enabled.	h) cellphone

5.12. Answer the questions to the text.

1. Who uses mobile phones?
2. What does the MSC register of cellphones contain?
3. What is the difference between a mobile phone and a cellphone?
4. What does the word "cellphone" imply?
5. How large is the cell?
6. How does the MSC prevent interference caused by a strong signal level?
7. What is the most suitable number of cells to form a cluster?
8. When were radiophones developed?
9. How does an MSC ensure that a cellphone is using the right frequency for a call?
10. What is permanently connected to MSC?

GRAMMAR

Participle

5.13. Translate the following sentences, paying attention to the functions of participles.

1. IC is a miniaturized electronic circuit **consisting** mainly of semiconductor devices that have been manufactured in the surface of a thin substrate of semiconductor material.
2. The integration was an enormous improvement over the manual assembly of circuits while **using** electronic components.
3. The next step taken in the late 1960s introduced MSI.
4. Further development **driven** by economic factors led to LSI.
5. All components **needed** for a computer are included on a single chip.
6. Computing, communication, manufacturing and transport systems **including** the Internet all depend on the existence of IC.
7. A neighbouring electron can move to fill the hole **leaving** a hole at the place it has just come from.
8. The photon **emitted** has a very specific wavelength.
9. A robot is a mechanical device **controlled** by a computer.

10. Network connections **using** radio signals without network cables are becoming more common.
11. Robots, **controlled** by computers with neural nets, would be able to learn for themselves rather than depend on fixed programs.
12. Barcode is the sequence of vertical parallel lines **used** to give items unique identification numbers.
13. A smart card is a plastic card **containing** a processor and memory chip.
14. Students **studying** at our university must know Mathematics well.
15. The device **made** in our laboratory will be used in industry.
16. Scientists **working** at new computers have a lot of different problems to solve.
17. **Having designed** the car radar the engineers started complex tests.
18. The engine **tested** showed that it needed no further improvements.

5.14. Translate the following sentences from English into Russian paying attention to the participles.

1. The size of the cells varies **depending on** the output power of the cellphone transmitters.
2. The MSC keeps a register of cellphones **indicating** their cell position.
3. The MSC causes the cellphone to tune to the **allocated** frequency channel.
4. The jobs of many **skilled** workers are threatened by the computer.
5. **Detailed** information about a suspect's background may be obtained from a computer.
6. New plastics are **being introduced** all the time.
7. Synthetic materials **resembling** ivory were widespread by 1900.
8. Electronic computers perform both arithmetic and logical operations, **making it possible** to control the process under rather complicated conditions.
9. System design goes through several stages, **becoming** more detailed in each stage.
10. **When being pure,** water is a colourless liquid.
11. **Using** the energy of the atom we produce electric energy at atomic power plants.
12. Algol is a system **being developed** and **intended** to become a universal programming language.
13. The compound **being treated** for several hours turned dark red.
14. The instrument **used** is very reliable.
15. **Written** in pencil the article was difficult to read.
16. We also discuss experiments **connected** with some **related** questions.
17. The recent talks resulted in the agreement just **signed.**
18. The data **obtained** outweighed those that we had had before.
19. The man **replacing** this device by a new one is our mechanic.
20. **Applying** this new method the operator received good results.
21. **When translating** the article he used no dictionary.
22. The parts **produced** by our plant are reliable.

Unit 6. COMPUTERS

Text A *History of Computing*
Text B *Configuration*

Grammar: gerund

Text A

HISTORY OF COMPUTING

Pretext exercises

6.1. Read the words and try to guess their meaning.

Mechanical, era, analytical, microprocessors, machines, personal, individuals, form, laptops, netbooks, smartphones, market, analysts.

6.2. Read the following words and notice their pronunciation.

refer	[rɪ`fə:]	abacus	[`æbəkəs]
astrolabe	[`æstrə(u)leɪb]	decennial	[dɪ`senɪəl]
appliance	[ə`plaɪəns]	obsolete	[`ɔbsəlɪt]

Memorize the following words and expressions

originally	*изначально; сначала*	**data processing**	*обработка данных*
to refer (to)	*иметь отношение, относиться*	**vacuum tube computer**	*ламповая вычислительная машина*
abacus	*абак (в мн.ч. abaci) древнейшее счётное устройство*	**transistor(ized) computer**	*вычислительная машина на транзисторах*
slide rule	*логарифмическая линейка*	**leap**	*прыжок, скачок (прям. и перен.)*

Analytical Engine	*Аналитическая машина (механический компьютер Ч. Бэббиджа)*	**domestic appliances**	*бытовая техника*
punched card	*перфокарта*	**in conjunction with**	*в сочетании с*
landmark point	*веха, поворотный пункт*	**obsolete**	*устарелый; вышедший из употребления*
gradually	*понемногу, постепенно*		

6.3. Read the text.

HISTORY OF COMPUTING

Originally, the term “computer” referred to a person who performed numerical calculations (a human computer) often with the aid of a mechanical calculating device. Examples of early mechanical computing devices included the abacus, the slide rule, etc. In 1623 Wilhelm Schickard built the first mechanical calculator and thus became the father of the computing era.

However, none of those devices fit the modern definition of a computer because they could not be programmed. In 1801, Joseph-Marie Jacquard developed a loom in which the pattern being woven was controlled by punched cards. The series of cards could be changed without changing the mechanical design of the loom. This was a landmark point in programmability. In 1837, Charles Babbage was the first to design a fully programmable mechanical computer that he called “The Analytical Engine”. In 1890, the United States Census Bureau used punch cards and sorting machines designed by Herman Hollerith to handle the flood of data from the decennial census mandated by the Constitution. Hollerith’s company eventually became the core of IBM. IBM developed punch card technology into a powerful tool for business data processing and produced an extensive line of specialized unit record equipment.

More powerful and flexible computing devices were constructed in the 1930s and 1940s, gradually adding the key features that are seen in modern computers. Vacuum tube computers were in use throughout the 1950s, but were largely replaced in the 1960s by transistor computers, which were smaller, faster, and cheaper, used less power and were more reliable. By the 1970s, the adoption of integrated circuit technology and the creation of microprocessors such as the Intel 4004 caused another leap in size, speed, cost and reliability. By the 1980s, computers had become sufficiently small and cheap to replace simple mechanical controls in domestic appliances such as washing machines. Around the same time, computers became

widely accessible for personal use by individuals in the form of personal computers. In conjunction with the widespread growth of the Internet since the 1990s, personal computers are becoming as common as the television and the telephone and almost all modern electronic devices contain a computer of some kind.

The future of computers seems to be in Cheap Laptops and small netbooks or handheld smartphones. It is predicted by many market analysts that personal desktop computers will soon be as obsolete as the room-sized computers first built back in the 1940's.

6.4. Read the following statements and decide if they are true (T) or false (F).

1. Originally, the term "computer" referred to a person which (that) performed numerical calculations.
2. Joseph Marie Jacquard made an improvement to the transistor computer.
3. In 1837, Charles Babbage conceptualized and designed a fully programmable mechanical computer that he called "The Analytical Brain".
4. In 1890, punch cards and sorting machines were used to handle the flood of data from the decennial census mandated by the Constitution.
5. Vacuum tube computers were in use throughout the 1950s, but were largely replaced in the 1960s by transistor computers.

6.5. Answer the questions to the text.

1. What were the examples of early mechanical computing devices?
2. What device was the first of a number of mechanical calculators?
3. Why was Jacquard loom an important step in the development of computers?
4. What year "The Analytical Engine" was designed?
5. What technologies had begun to appear by the end of the 19th century?
6. What was the first name of IBM?
7. What caused another leap in size, speed, cost and reliability by the 1970s?
8. Why are personal computers becoming as common as the television and the telephone?

Text B

CONFIGURATION

Pretext exercises

6.6. Read the following words and expressions and try to guess their meaning.

Minimal, typical, desktop computer, processor, personal computer, central, program, microprocessor, cable, to install, optical, system, CD, installation, demonstrations, problem, video card, graphics card, graphics adapter, visual display unit, sound card,

electromagnetic radiation, monitor, typical computer, network card, modem, router, printer, scanner, web cam, speakers, microphone, gaming devices, joystick, laptop computer, laptop, notebook, mobility, interface, hardware, parallel and serial ports, battery, operation.

6.7. Read the following words and notice their pronunciation.

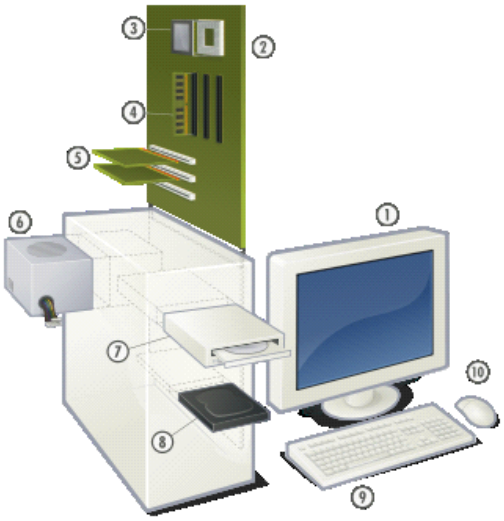
keyboard	[`kiːbɔːd]	processor	[`prəusesə]
execute	[`eksɪkjuːt]	video	[`vɪdɪəu]
microprocessor	[ˌmaɪkrə`prəusesə]	visual	[`vɪʒuəl]
media	[`miːdɪə]	interface	[`ɪntəfeɪs]
microphone	[`maɪkrəfəun]	hardware	[`hɑːdwɛə]

Memorize the following words and expressions

setup	*устройство*	**read-only**	*только для чтения; неизменяемый*
computer case	*корпус компьютера*	**to render**	*воспроизводить; передавать*
power supply (PS)	*источник питания, блок питания*	**visual display unit**	*дисплей; монитор*
heat sink	*теплоотвод*	**external = EXT**	*внешний*
fan	*вентилятор*	**card reader**	*устройство чтения (н-р, смарт-карт)*
primary circuit	*первичная цепь*	**to facilitate**	*содействовать; способствовать*
central processing unit	*центральный процессор*	**readily**	*быстро, без задержки*
instruction	*машинная команда*	**outlet**	*вывод; розетка*
plug into	*соединять с помощью штепселя или штекера*	**hardware**	*аппаратное обеспечение, хардвер, "железо"*
operating system, operational system (OS)	*операционная система (ОС)*	**interface**	*интерфейс; часть программы, взаимодействующая с пользователем*

6.8. Read the text.

CONFIGURATION



Hardware of a modern Personal Computer:

1 – monitor;
2 – motherboard;
3 – CPU (microprocessor);
4 – RAM memory
5 – expansion cards;
6 – power supply;
7 – optical disc drive;
8 – hard disk
9 – keyboard;
10 – mouse.

A minimal setup of a typical contemporary desktop computer would be: a computer case with power supply (usually sold together), a motherboard, a processor with a heat sink and a fan (usually sold together); at least one memory card, a mass storage, a keyboard and a mouse for input, a monitor for output.

The motherboard (or mainboard) is the primary circuit board within a personal computer. It connects everything together. The central processing unit, or CPU, is that part of a computer which executes software program instructions. Nearly all PCs contain a type of CPU known as a microprocessor. The microprocessor is often plugged into the motherboard using one of many different types of a socket.

The mass storage is connected to the motherboard with cables and can be installed in the computer case or in a separate case. The mass storage can be: a hard disk, a floppy drive or a Zip drive (both with removable media), an optical drive (CD or DVD, removable, usually read-only). The operating system (e.g.: Microsoft Windows, Mac OS, Linux or many others) can be located on either of these, but typically it's on one of the hard disks. A live CD is also possible, but it is very slow and is usually used for installation of the OS, demonstrations, or problem solving.

The memory card(s) and video card are mounted directly onto the motherboard in expansion slots. The video card – otherwise called a graphics card, graphics adapter or video adapter – processes and renders the graphics output from the computer to the computer display, also called the visual display unit (VDU), and is an essential part of the modern computer.

The keyboard and the mouse are external and connected to the

back plate of the motherboard. The monitor is also connected to the back plate, not (usually) directly to the motherboard, but to a connector in the graphics card.

A typical computer also has a network card, a modem and possibly a router. Common additions connected on the outside (peripherals) are: a printer, a scanner, a web cam, speakers, a microphone, a headset, a card reader, gaming devices, such as a joystick.

Nowadays laptop computers or simply laptops (also called notebooks) are in wide use. They are small personal computers designed for mobility. Usually all of the interface hardware needed to operate the laptop, such as parallel and serial ports, graphics card, sound channel, *etc*., is built-in to a single unit. They contain batteries to facilitate operation without a readily available electrical outlet.

Notes to the text

mass storage	*внешняя память большого объёма, массовая память; накопитель (информации)*
software program	*программа, реализованная программно (в отличие от реализованной аппаратно)*
socket	*гнездо; (соединительная) панель; розетка (гнездовая часть разъёмного соединения); проф. сокет*
Zip drive	*zip-дисковод (дисковод для специальных дисков емкостью 100 мегабайт и более)*
removable media	*съёмный носитель, сменный носитель (CD, DV, гибкие диски, флэш)*
live	*1) подключенный к источнику (электро)питания 2) реальный, живой (напр. звук)*
expansion slot	*гнездо для платы расширения (интерфейсных карт, сетевых адаптеров и т. д.)*
back plate	*задняя панель*
router	*маршрутизатор (устройство для соединения сетей, использующих разные архитектуры и протоколы)*

6.9. Match the English terms with their definitions.

1. monitor	a. an output device which changes output data into printed form
2. primary storage (RAM)	b. an input device like a typewriter for entering characters
3. secondary storage (a hard disk)	c. an input device used in computer games for controlling the cursor or some other symbol in its movement around a screen
4. keyboard	d. random access memory: this is memory which can be read and written to

5. mouse	e. an input device which reads images on paper using a photoelectric cell and produces a computer graphic file as output
6. joystick	f. a fixed disk inside a computer which may not be removed
7. printer	g. the screen of a computer terminal or PC
8. scanner	h. a device used to point at a location on a computer screen

6.10. Use the expressions from the box and complete the following sentences.

mass storage	**notebooks**	**central processing unit**	**video card**
optical drive	**microprocessor**	**visual display unit**	**motherboard**

1. The … is the primary circuit board within a personal computer.
2. The … … … is that part of a computer which executes software program instructions.
3. Nearly all PCs contain a type of CPU known as a … .
4. The … … can be: a hard disk, a floppy drive or a Zip drive, an … … (CD or DVD, removable, usually read-only).
5. The … … processes and renders the graphics output from the computer to the computer display, also called the … … ….
6. Nowadays laptop computers or simply laptops (also called …) are in wide use.

6.11. Translate the following sentences. Give the Russian equivalents of the words in bold.

1. **Hardware** means the different types of equipment a computer consists of.
2. A computer's hardware comprises a **central processing unit (CPU)** which is the heart and brain of the computer.
3. **Input and output devices** capable of putting information into a computer and getting it out of it are types of peripheral equipment. **Peripherals** are the units connected to the CPU: input devices, output devices and storage devices.
4. The simplest and most common type of input device is a keyboard, containing a typewriter **keyboard**.
5. **A laser printer** is a kind of output device to print information.
6. **Software** means the programs needed to operate computer equipment.
7. These programs are on **disks,** the **hard disks** inside the computer, or **floppy disks,** or on **CD-ROMs,** that is, Compact Disk Read Only Memory, which you

can put on or store a large amount of information. A **disk** is a storage device made of flat circular plates with magnetizable surfaces. A **hard disk** is a disk made from a solid magnetic material and used as a storage device. A **floppy disk** (also called diskette) is a disk made of flexible plastic material upon which data are stored on magnetic tracks. **Tracks** are areas marked on the surface of a disk. A **disk drive** is the electronic mechanism that actually reads what is on a disk. In hard disks, the disk and the drive are built into a single unit.

8. A **word processor** is a computer used to write documents, letters and reports, or the software that is used for this purpose.
9. **Databases** are programs, which allow you to store, look at or change a large quantity of information quickly and easily.
10. **Graphics** are pictures and symbols a computer program can produce.
11. An extra copy on a floppy disk is called a **back-up copy,** a copy of data or software, usually kept in case the original disk is damaged or destroyed.
12. A **bug** possible in a computer operation, also a virus is a software problem or error in a program. **Debugging** means correcting program errors or bugs.
13. People send **e-mail** (electronic mail) messages with the help of the **Internet,** a system that lets computers connect by telephone lines.
14. A **laptop** is a portable computer weighing about 204-kg.
15. With a device called the **mouse** you can do a number of things by **clicking** on different **icons**.
16. A mouse is a small input device, on the top of which there are one or more buttons for communicating with the computer.
17. **Clicking** is a basic mouse action to place a cursor to close a window, etc.
18. An **icon** is a small picture representing an object, process or function.

GRAMMAR

Gerund

6.12. Translate the following sentences.

1. I am interested in **giving** you effective training.
2. He suggested **setting up** a program committee for this symposium.
3. There are good reasons for **making** a compromise.

4. The process of **editing** this book will take some time.
5. **Designing** and **manufacturing** of minicomputers were started under the international cooperation.
6. I remember **seeing** Dr. White at the last conference.
7. The only solution of the problem is **storing** medical knowledge in a computer.
8. Some people insist on **including** this question in the conference program.
9. These facts were taken into account in **estimating** the results.
10. He improved his report by **changing** the end.

6.13. Translate the following sentences. What parts of speech are *–ing* forms: noun, adjective, participle or gerund?

1. In 1952, a major **computing** company took a decision to get out of the business of **making** mainframe computers.
2. The **following** year they reversed their decision.
3. The first IBM PC was developed **using existing** available electrical components.
4. When IBM were **looking** for an operation system, they went initially to Digital Research, who were market leaders in command-based **operating** systems.
5. The basic job of computers is the **processing** of information.
6. Today's personal computers are known to be used for different purposes: for **testing** new theories or models, in **book-keeping**, **accounting** and management.
7. Most traditional communications media **including** telephone, music, film, and television are reshaped or redefined by the Internet, **giving** birth to new services such as Voice over Internet Protocol (VoIP) and IPTV.
8. Newspaper, book and other print **publishing** are **adapting** to Web site technology.
9. Electronic mail (e-mail) is only the **starting** point of using computer communication services.
10. Computer will offer you **training** programs in **accounting**, foreign languages and many other fields.
11. A **functioning** computer system combines hardware elements with software elements.
12. The **defining** feature of modern computers which distinguishes them from all other machines is that they can be programmed.

Unit 7. THE INTERNET

Text A *The Internet*
Text B *Programming Languages*
Grammar: infinitive

Text A

THE INTERNET

Pretext exercises

7.1. Read the following words and expressions and try to guess their meaning.

Global system, computer networks, user, million, private, public, academic, local, global, electronic, optical, networking technology, information resources and services, hypertext documents, World Wide Web (WWW), infrastructure, electronic mail, materials, journals, information, system, the Internet, hypertext, document, special program, browser, Web pages, click, Web sites, code, commands, textual and graphical information, e-mail, film, Web site, actors of the film, telephone lines, fibre-optic cables, satellites, signals.

7.2. Read the following words and notice their pronunciation.

suite	[swɪ:t]	standard	[`stændəd]
private	[`praɪvɪt]	resource	[rɪ`zɔ:s]
array	[ə`reɪ]	virtual	[`və:tʃuəl], [`və:tjuəl]
hypertext	[`hai`pətekst]	resource	[rɪ`zɔ:s]
navigate	[`nævɪgeɪt]	aerial	[`ɛərɪəl]
vice versa	[`vaɪsɪ`və:sə]		

Memorize the following words and expressions

Internet Protocol Suite	*стек протоколов IP*	**navigate**	*передвигаться*
array	*массив (информации, данных)*	**to surf the Web**	*бродить по сети*
networking technology	*сетевые технические средства*	**vice versa**	***лат.*** *наоборот*

World Wide Web (WWW)	*глобальная гипертекстовая система для поиска и использования ресурсов Интернет, «всемирная паутина»*	**dish aerial**	*параболическая антенна*
hypertext markup language	*язык гипертекстовой маркировки, язык HTML*	**wide area network**	*глобальная сеть*

7.3 Read the text.

THE INTERNET

The Internet is a global system of interconnected computer networks that use the standard Internet Protocol Suite (TCP/IP) to serve billions of users worldwide. It is a network of networks that consists of millions of private, public, academic, business, and government networks, of local to global scope, that are linked by a broad array of electronic, wireless and optical networking technologies. The Internet carries a vast range of information resources and services, such as the interlinked hypertext documents of the World Wide Web (WWW) and the infrastructure to support electronic mail.

With a few touches at a keyboard a person can get access to materials in almost everywhere. One can have access to full-text newspapers, magazines, journals, reference works, and even books. The Web is one of the best resources for up-to-date information. It is a hypertext-based system by which you can navigate through the Internet. Hypertext is the text that contains links to other documents. A special program known as «browser» can help you find news, pictures, virtual museums, electronic magazines, etc. and print Web pages. You can also click on keywords or buttons that take you to other pages or other Web sites. This is possible because browsers understand hypertext markup language or code, a set of commands to indicate how a Web page is formatted and displayed.

Internet Video conferencing programs enable users to talk to and see each other, exchange textual and graphical information, and collaborate.

Internet TV sets allow you to surf the Web and have e-mail while you are watching TV, or vice versa. Imagine watching a film on TV and simultaneously accessing a Web site where you get information on the actors of the film. The next generation of Internet-enabled televisions will incorporate a smart-card for home shopping, banking and other interactive services. Internet-enabled TV means a TV set used as an Internet device.

The Internet is a good example of a wide area network (WAN). For long-distance or worldwide communications, computers are usually connected into a wide area network to form a single integrated network. Networks can be linked together by telephone lines or fibre-optic cables. Modern telecommunication systems use

fibre-optic cables because they offer considerable advantages. The cables require little physical space, they are safe as they don't carry electricity, and they avoid electromagnetic interference.

Networks on different continents can also be connected via satellites. Computers are connected by means of a modem to ordinary telephone lines or fibre-optic cables, which are linked to a dish aerial. Communication satellites receive and send signals on a transcontinental scale.

7.4. Answer the questions to the text.

1. What does the Internet consist of?
2. What are networks linked by?
3. What is the Web?
4. What does hypertext contain?
5. What is the browser?
6. What do Internet Video conferencing programs enable users to do?
7. What does Internet-enabled TV mean?
8. How can networks be linked together?
9. Why do modern telecommunication systems use fibre-optic cables?
10. How are computers connected?

Text B

PROGRAMMING LANGUAGES

Pretext exercises

7.5. Read the following words and expressions and try to guess their meaning.

Machine code, symbolic languages, special program, equivalent, assembler, information structures, actions, architecture, person, compiler, popular, commercial, mini, micro and personal computers, version, style of programming, generation.

7.6. Read the following words and notice their pronunciation.

process	[`prəuses]	version	[`və:ʃən]
sequence	[`si:kwəns]	compiler	[kəm`paılə]
advantage	[əd`vɑ:ntıʤ]	artificial	[ˌɑ:tı`fıʃəl]

Memorize the following words and expressions

machine code	*машинный код, программа на машинном языке*	**assembler**	*ассемблер (машинно-ориентированный язык программирования)*

basic language	*основной язык*	**run**	***зд.*** *выполнять, запускать программу*
symbolic language	*символический язык*	**compiler**	*компилятор, компилирующая программа*
portable program	*мобильная программа (легко переносимая на компьютер другого типа)*	**software engineer**	*специалист по разработке (разработчик) программного обеспечения*
instruction	*машинная команда, команда (в языках низкого уровня)*	**application program**	*прикладная программа*
machine oriented language	*машинно-ориентированный язык*	**artificial intelligence**	*искусственный интеллект*

7.7. Read the text.

PROGRAMMING LANGUAGES

The only language computers can understand directly is called machine code. It consists of the Is and 0s (binary code) that are processed by the CPU. However, machine code as a means of communication is very difficult to write. That is why it is necessary to use symbolic languages that are easier to understand. Then, by using a special program, these languages can be translated into machine code.

Basic languages, in which the program is similar to the machine code version, are known as low-level languages. In these languages, each instruction is equivalent to a single machine code instruction, and the program is converted into machine code by a special program called an assembler. These languages are quite complex and restricted to particular computers.

To make the program easier to write, higher-level languages were developed such as BASIC, COBOL, FORTRAN, Pascal, Ada, C and others. A higher-level language is a problem oriented programming language, whereas a low-level language is machine oriented. This means that a high-level language is a convenient and simple means of describing the information structures and sequences of actions to be performed for a particular task.

A high-level language is independent of the architecture of the computer which supports it. This has two advantages. Firstly, the person writing the program does not have to know anything about the computer the program will be run on. Secondly, programs are portable, that is, the same program can (in theory) be run on different

types of computer. Programs written in one of these languages should be converted by means of a compiler into a lower-level language or machine code so that the CPU could understand it.

C, a high-level programming language, is very popular today because it is small, so it is not too hard to learn, it is very efficient and portable so one can use it with all kinds of computers. A lot of software engineers use C to write commercial applications programs for mini, micro and personal computers. There are also various versions of C – C^{++} and Objective C, which represent a new style of programming.

People communicate instructions to the computer in symbolic languages and the easier this communication can be made, the wider the application of computers will be. Scientists are already working on Artificial Intelligence and the next generation of computers may be able to understand human languages.

Notes to the text

BASIC (Beginner's All-purpose Symbolic Instruction Code)	*язык программирования БЕЙСИК Первоначально язык реализовывался в виде интерпретаторов, что существенно облегчало программирование и особенно отладку программ.*
COBOL (COmmon Business-Oriented Language)	*язык программирования КОБОЛ для экономических задач.*
FORTRAN (*сокр.* **от FORmula TRANslator)**	*язык программирования ФОРТРАН для численных методов.*
Pascal	*язык программирования Паскаль; широко используется для обучения студентов программированию.*

7.8. Match the English terms with their definitions.

1. COBOL	a. a computer programming language that uses common English terms
2. FORTRAN	b. a high-level computer programming language developed as a teaching language: used for general-purpose programming
3. BASIC	c. a high-level computer programming language for mathematical and scientific purposes, designed to facilitate and speed up the solving of complex problems
4. Pascal	d. a high-level computer programming language designed for general commercial use

7.9. Use the expressions from the box and complete the following sentences.

programming compiler programmed program assembler language programmers portable low-level machine code

1. A computer ... is a set of instructions that tells the computer what to do.
2. Converting an algorithm into a sequence of instructions in a programming language is called ….
3. Most computer ... make a plan of the program before writing it.
4. Coding is the translation of the logical steps into a programming ....
5. In the next century computers will be ... in natural languages like English or French.
6. A ... is a special program that converts a program written in a high-level language into a program written in a lower level language.
7. It is difficult to use ... ..., which is the only language understood by the processor.
8. A special program called ... converts a program written in a low-level language into machine code.
9. If the same program can be used for different computers, it is called ... .
10. In a ... language each instruction has a corresponding machine code equivalent.

7.10. Topic for discussion:

The new programming language you have heard of or read about.

GRAMMAR

Infinitive

7.11. Put the verbs in brackets into the right form, as in the model.

Model: – He didn't want **to be asked** that question. (***ask*** – *simple passive*)

1. I'm sorry … you but the question is very important (***disturb*** – *simple active*)
2. I was very upset … the seminar. (***miss*** – *perfect active*)
3. The high-speed devices … as secondary storage are both input and output devices. (***use*** – *perfect passive*)
4. These difficulties are too great … . (***ignore*** – *simple passive*)
5. Russia was the first country … the cosmic era. (***start*** – *simple active*)
6. A printer is an example of a device … output in a human readable format. (***produce*** – *simple active*)

7.12. Translate the following sentences, point out the infinitive function.

1. To translate such an article without a dictionary is difficult.
2. Automation makes it possible **to obtain and develop** new sources of energy.
3. **To work** with computer was new to us.
4. Signals **to be measured** must be strong enough.
5. Our aim is **to translate** technical articles without a dictionary.
6. **To distinguish** between cause and effect is sometimes difficult.
7. A special electronic device signals the engine **to stop**.
8. **To convert** the electrical connections of the peripheral an interface is used.
9. Some minicomputers allow the word length **to vary**.
10. Programming a computer involves analyzing the problem **to be solved** and a plan **to solve** it.
11. **To develop** the supercomputer, highly developed electronics and new materials were required.
12. Recently a radar **to be mounted** on cars has been developed.
13. There are projects **to use** lasers for long distance communication.
14. In a new Japanese car the information **to be received** by the driver will come through a navigation earth satellite.
15. A very interesting problem is **to produce** a practically limitless source of energy.
16. Lasers **to be placed** on Earth satellites will transform solar radiation into laser beams.
17. The idea **to use** this substance is not new.
18. He described the device **to be used** in all modern systems.
19. **To translate** the text without a dictionary is difficult.
20. **To carry out** the experiment you must improve the device.

7.13. Translate the following sentences.

1. To carry out this research work requires special knowledge.
2. We'll consider a very simple example to explain this phenomenon.
3. The fastest way to detect an artificial satellite is by radio.
4. We are to study the main laws of physics.
5. An electronic machine has to be used to perform these calculations.
6. To analyze this effect is to take into consideration all the elements of the circuit.
7. The machinery to be installed in our laboratory was built by the modern machine-building plant.
8. To prevent corrosion metal must be covered with paint.
9. The wire to be tested is connected to the measuring instrument.
10. The voltage that is to be produced in this circuit is to be sufficiently high.
11. The motor is a device to change mechanical energy into electric one.
12. The galvanometer must be sensitive enough to detect the existence of the current.

13. The main objective of the cosmonaut was to study the human organism in space.
14. The signals of different frequencies are combined to form a single complex wave output which is transmitted to the receiver.
15. Most minicomputers have extra registers and indicators to perform particular functions.
16. We will discuss the operation of the junction transistor to show how amplification may be achieved.
17. Thus thermal energy at room temperature is sufficient to remove the carriers from their parent atoms.
18. The energy required to remove the electron is called impurity ionization energy.
19. The useful work to be done by a machine is less than the total work to be performed by it.
20. One of the best ways to keep the car speed constant is to use a computer.
21. In a new Japanese car the information to be received by the driver will come through a navigation earth satellite.
22. To detect objects at a distance such as ships, aircrafts, buildings, etc. is of great importance for navigation both at sea and in air.
23. Materials used for superliner structures must be strong enough to withstand the air resistance at high speeds.
24. A very interesting problem is to produce a practically limitless source of energy.
25. One of the ways to make planes as economical as possible is to lighten the aircraft by using new composite materials.
26. All a pilot needs to do is to tune to radio transmitters and he will get direction signals he needs.
27. A new electronic device to be installed in the car's panel will calculate how far one can drive on the fuel left.
28. Besides, there is one more problem to be studied – that of surface cooling.
29. Every student of Cambridge is to go to his tutor once a week to discuss with the work done.
30. Some metals and glasses to be cooled down to the point of solidification in space can be brought back to earth.

7.14. Translate the text. Point out the infinitive function.

Information is frequently considered **to be** almost synonymous with knowledge. It is in this context that information scientists are concerned with information. What then is a satisfactory definition of information? In order **to define** information, the thing **to begin with** is the use of information. Information is used **to make** decisions; in fact, the only available resource for a decision maker is information. The decision maker may be a single person, a committee, or a machine, but in any case the decision is based on information selected from the available data. Thus information represents data of value **to make** decisions.

Unit 8. INFORMATION SECURITY

Text A *Information Security*
Text B *Computer Crimes*
Grammar: **revising verbals**

Text A

INFORMATION SECURITY

Pretext exercises

8.1. Read the following words and expressions and try to guess their meaning.

Biological, virus, organism, infect, cell, program, routine, resource, operating system, file, copy, technique, resident, activate, destructive, message, monitor, screen, detect, hard disk, instruction, command, limit, effect, control, install, attack, password, location, container, guarantee.

8.2. Read the following words and notice their pronunciation.

routine	[ru`ti:n]	disaster	[dɪ`zɑ:stə]
dormant	[`dɔ:mənt]	measure	[`meʒə]
monitor	[`mɔnɪtə]	uninterruptible	[ˌənˌintə`rʌptəbəl]
sequence	[`si:kwəns]	supply	[sə`plaɪ]
patching	[`pætʃɪŋ]	surge	[sə:ʤ]
virus	[`vaɪrəs]	fireproof	[`faɪəpru:f]

8.3. Choose the best translation to the following word-groups.

1. Virus protection program	a) программа защиты от вирусов b) программа защиты вирусов c) вирусная защитная программа
2. Common programming technique	a) обычный метод программирования b) обычный программный метод c) метод обычного программирования
3. Monitor screen	a) мониторный экран b) экран монитора c) отслеживание экрана
4. Normal execution sequence	a) обычное выполнение последовательности b) последовательность нормы выполнения c) обычная последовательность выполнения
5. Uninterruptible power supply	a) мощность бесперебойной подачи b) бесперебойный источник питания c) источник бесперебойной энергии

Memorize the following words and expressions

host program	*главная программа*	**misdirection**	*неправильное направление, указание*
to reproduce	*воспроизводить*	**to hide**	*скрываться, прятать*
patching	*коммутация, вставка в программу*	**fairly**	*довольно*
operating system	*операционная система*	**disaster**	*катастрофа, бедствие*
to run	*запускать, выполнять*	**security**	*защита, безопасность*
to stay resident	*оставаться в памяти*	**to take measures**	*принимать меры*
payload	*полезная нагрузка*	**to implement**	*выполнять, осуществлять*
dormant	*неактивный, бездействующий*	**backup**	*резервная копия*
firewall	*межсетевое устройство защиты*	**uninterruptible**	*бесперебойный*
variety	*множество, разнообразие*	**surge protector**	*устройство защиты от скачков напряжения*
to remain	*оставаться*	**vendor-supplied software**	*программное обеспечение поставщика*
to replace	*заменять*	**fireproof**	*огнеупорный*
encrypted data	*зашифрованные данные*	**to lock**	*запирать, закрывать*
destructive	*разрушительный*	**internal**	*внутренний*
execution	*выполнение*	**external**	*внешний*

8.4. Read the text.

INFORMATION SECURITY

A biological virus is a very small, simple organism that infects living cells, known as a host, by attaching itself to them and using them to reproduce itself. This often causes harm to the host cells.

Similarly, a computer virus is a very small program routine that infects a computer system and uses its resources to reproduce itself. It often does this by patching the operating system to enable it to detect program files, such as .COM or .EXE files. It

then copies itself into those files. This sometimes causes harm to the host computer system.

When the user runs an infected program, it is loaded into memory carrying the virus. The virus uses a common programming technique to stay resident in memory. It can then use a reproduction routine to infect other programs. This process continues until the computer is switched off.

The virus may also contain a payload that remains dormant until a trigger event activates it, such as the user pressing a particular key. The payload can have a variety of forms. It might do something relatively harmless such as displaying a message on the monitor screen or it might do something more destructive such as deleting files on the hard disk.

When it infects a file, the virus replaces the first instruction in the host program with a command that changes the normal execution sequence. This type of command is known as a JUMP command and causes the virus instructions to be executed before the host program. The virus then returns control to the host program which then continues with its normal sequence of instructions and is executed in the normal way.

To be a virus, a program only needs to have a reproduction routine that enables it to infect other programs. Viruses can, however, have four main parts. A misdirection routine that enables it to hide itself; a reproduction routine that allows it to copy itself to other programs; a trigger that causes the payload to be activated at a particular time or when a particular event takes place; and a payload that may be a fairly harmless joke or may be very destructive. A program that has a payload but does not have a reproduction routine is known as a Trojan.

To prevent or limit the effects of disaster you should take security measures and protect hardware and software. If your work deals with the use of the Internet, you should implement network controls by installing firewalls to protect external and internal attacks. Another way of protection is using encrypted data including monitoring username and password use. Don’t use common names or dictionary words in passwords. To protect from natural disasters install uninterruptible power supplies and surge protectors.

Periodically make full backups, which copy all files. If your files are very important, keep backups in separate locations, in fireproof containers, under lock and key. Virus protection programs are another way of feeling safe. Use only vendor-supplied software products that guarantee they are virus-free.

8.5. Answer the questions to the text.

1. How does a biological virus infect living cells?
2. What is a computer virus?
3. What files does the virus copy itself into?
4. What technique is used by virus to become resident in memory?
5. How long does the process of infection continue?
6. How long does a payload remain dormant?

7. What is a trigger event?
8. What forms can the payload have?
9. What event changes the normal execution sequence?
10. What does the program need to have to be a virus?
11. How many parts do viruses usually have?
12. How is the program without reproduction routine named?
13. What should you do to prevent external and internal attacks?
14. Why should you install uninterruptible power supplies and surge protectors?
15. What software products guarantee they are virus-free?

8.6. Complete the sentences with appropriate words from the box.

backups **to be executed** **payload** **reproduction** **host program** **resources** **hide** **firewalls** **encrypted data** **security measures**

1. A computer virus infects a computer system and uses its … to reproduce itself.
2. The virus contains a … that remains dormant until the user presses a particular key.
3. The virus replaces the first instruction in the … with a command that changes the normal execution sequence.
4. A JUMP command causes the virus instructions … before the host program.
5. A … routine is needed to infect other programs.
6. A misdirection routine enables a virus to … itself.
7. To protect hardware and software you should take ….
8. Installing … helps to withstand external and internal attacks.
9. To protect your work from stealing use ….
10. Copy all your files and keep your … in separate locations under lock and key.

Text B

COMPUTER CRIMES

Pretext exercises

8.7. Read the following words and word-combinations and try to guess their meaning.

Physically, business, original, manipulation, act, place, instruction, function, normally, accumulate, individual, identification, code, file, sale, distribute, technique, modify, address, server, nature, detect, reputation, percent, reason.

8.8. Read the following words and notice their pronunciation.

employee	[ɪm`plɔɪi:] [ˌemplɔɪ`i:]	guilty	[`gɪltɪ]
prosecute	[`prɔsɪkju:t]	ramification	[ˌræmɪfɪ`keɪʃn]

fraud	[frɔːd]	tolerate	[`tɔləreɪt]
alter	[`ɔːltə]	accident	[`æksɪdənt]
property	[`prɔpətɪ]	piracy	[`paɪərəsɪ]
illegitimate	[ˌɪlɪ`ʤɪtəmənt]	bombing	[`bɔmɪŋ]

Memorize the following words and word combinations

computer crime	*преступление, совершаемое с помощью компьютера*	**as well**	*также*
to get hurt	*пострадать*	**account**	*счёт, учётная запись*
deserve	*заслуживать*	**to account**	*рассчитывать*
after all	*в конце концов*	**victim**	*жертва*
criminal	*преступник*	**to be unaware of**	*не подозревать*
to steal	*воровать, красть*	**to log off**	*выходить из системы*
intention	*намерение, цель*	**piracy**	*пиратство*
to prosecute	*преследовать судебным порядком*	**data diddling**	*сдвиг элементов данных*
to crash	*выводить из строя*	**mail bombing**	*бомбардировка почтового адреса*
theft	*кража*	**to inundate**	*наводнять*
destruction	*разрушение*	**in addition**	*кроме того*
to commit	*совершать*	**to compromise**	*подвергать риску*
disgruntled	*недовольный*	**by accident**	*случайно*
employee	*работник*	**by no means**	*отнюдь не, никоим образом*
property	*собственность*	**to assure**	*гарантировать*
benefit	*выгода, польза*	**fraud**	*обман, мошенничество*
to alter	*изменять (данные)*	**attorney**	*районный прокурор*
illegitimate	*незаконный*	**ramification**	*последствия*

8.10. Read the text.

COMPUTER CRIMES

Computer crimes are ‘clean’ white-collar crimes; no one gets physically hurt. But computer crime is serious business and deserves to be taken seriously by everyone. After all, if computer criminals can steal money from major banks, can they not steal from you?

Computer crime basically falls into three categories:

- Theft of computer time for development of software for personal use or with the intention of selling it. It is difficult to prove programs were stolen when copies are made because the originals are still in the hands of the original owners.
- Theft, destruction, or manipulation of programs or data. Such acts may be committed by disgruntled employees or by persons wishing to use another’s property for their own benefit.
- Altering data stored in a computer file.

The Trojan Horse is the name given to the crime in which a computer criminal is able to place instructions in someone else’s program that allow the program to function normally but perform additional, illegitimate functions as well.

Salami shaving method means manipulating programs or data so that small amounts of money are deducted from a large number of transactions or accounts and accumulated elsewhere. The victims are often unaware of the crime because the amount taken from any individual is so small.

Piggybacking means using another person’s identification code or using that person’s files before he or she has logged off.

Software piracy is unauthorised copying of a program for sale or distributing to other users.

Data diddling is a technique whereby data is modified before it goes into the computer file. Once in the file, it is not as visible.

Mail bombing is inundating an email address with thousands of messages, slowing or even crashing the server.

Prosecuting the computer criminal is difficult because discovery is often difficult. The nature of the crime is such that it is hard to detect, and thus many times it simply goes undetected. In addition, crimes that are detected – an estimated 85 percent of the time – never reported to the authorities. By law, banks have to make a report when their computer systems have been compromised, but other busineses do not. Often they choose not to report because they are worried about their reputations and credibility in the community.

Most computer crimes, unfortunately, are discovered by accident. Even if a computer crime is detected, prosecution is by no means assured. Thre are a number of reasons

for this. First, law enforcement agencies do not fully understand the complexities of computer-related fraud. Second, few attorneys are qualified to handle computer crime cases. Third, judges are not educated in the ways of computers and may not consider data valuable.

In short, the chances of committing computer crimes and having them go undetected are, unfortunately, good. And the chances that, if detected, there will be no ramifications are also good: a computer criminal may not go to jail, may not be found guilty if prosecuted, and may not even be prosecuted. You can be sure, however, that this will not be tolerated for long.

8.11. Read the following sentences and decide if they are true (T) or false (F).

1. Everyone gets physically hurt in computer crimes.
2. A computer crime doesn't deserve to be taken seriously.
3. Computer crimes fall into 4 categories.
4. It is easy to prove that programs were stolen.
5. Altering data stored in smb's computer file is not a crime at all.
6. The Trojan Horse can replicate itself.
7. The victims of 'Salami shaving' method of stealing money are always aware of the crime.
8. Software piracy is unauthorised copying of programs.
9. Mail bombing can crash the server.
10. Prosecuting the computer criminals is impossible.
11. Businesses choose not to report about the crime because they are worried about their reputation.
12. The computer criminal being caught never goes to jail.

8.12. Answer the questions to the text.

1. Why is a computer crime called 'clean'?
2. How many categories does a computer crime fall into?
3. What is the name of the virus which allows the program to function normally but performs additional illegitimate functions?
4. What does 'Salami shaving' mean?
5. Which method is used by hackers to slow down or even crash the server?
6. Why is it difficult to punish computer criminals?
7. Do the banks have to make a report about the crime against them?
8. Why do other businesses prefer not to report about the crime?
9. How are most computer crimes discovered?
10. Why do computer criminals often remain unpunished even if they are detected?
11. What is the percentage of detected crimes which are never reported to the authorities?

8.13. Discuss the following topics.

1. Computer crime and prosecution.

2. Virus-protection software that is used nowadays. Which is the most effective?
3. Ways of protecting hardware and software.

GRAMMAR

Неличные формы (Verbals)

8.14. Translate the following sentences paying attention to the function of the gerund and participle I.

1. Numbers can be multiplied by repeated addition, by **adding** and **shifting** or by **using** multiplication tables.
2. **Adding** numbers is the easiest process in the system of calculation.
3. **Having made** a great number of experiments with different devices the research group chose the best one for practical work.
4. At least one advantage of **using** this technique is obvious.
5. Each research center is interested in **training** a younger generation of efficient specialists.
6. We are **developing** a new program of cooperation.
7. **Acquiring** knowledge is not sufficient in itself; you must also practice the art of **applying** this knowledge to problems you hit upon.
8. The applications of laser techniques are **expanding** very rapidly.
9. The next question of the discussion is **making** a program for the computer.
10. When **discussing** a problem they argued a lot.
11. M**inimizing** experimental errors is one of our principal difficulties.
12. **Writing the article** he had to use a lot of foreign materials.
13. We found the error without **repeating** this experiment.
14. I suggest **exchanging** the latest information on this subject.

8.15. Translate the sentences from Russian into English using the gerund or participle I. Point out their functions.

1. **Переводить** статьи с английского языка на русский необходимо каждому инженеру.
2. Мое хобби – **переводить** статьи.
3. Он **переводит** интересную статью сейчас.
4. Он любит **переводить** статьи.
5. Я часто читаю статьи о различных способах **перевода**.
6. Его способ **перевода** статьи не очень хороший.
7. Человек, **переводящий (который переводит)** статью, – наш коллега.
8. **Прежде чем переводить** статью, нужно как следует научиться этому .
9. **Переводя** статью, студент пользовался словарем.

Unit 9. OPTICAL COMMUNICATION

Text A *Modern Light-Wave Communication Technology*
Text B *Optical Technology*

Grammar: **absolute participle constructions, gerund construction**

Text A

MODERN LIGHT-WAVE COMMUNICATION TECHNOLOGY

Pretext exercises

9.1. Read the following words and try to guess their meaning.

Decade, concept, second, system, type, cable, communication, electron, copper, diameter, interference, regeneration, resistance.

9.2. Read the following words and notice their pronunciation.

efficiency	[ɪ`fɪʃ(ə)nsɪ]	versatile	[`vəːsətaɪl]
fibre	[`faɪbə]	quality	[`kwɔlətɪ]
alternately	[ɔːl`təːnətlɪ]	install	[ɪn`stɔːl]
substitute	[`sʌbstɪtjuːt]	lightguide	[`laɪtgaɪd]
immune	[ɪ`mjuːn]	pure	[pjuə]
instead	[ɪn`sted]	diameter	[daɪ`æmɪtə]

Memorize the following words and expressions

decade	*десятилетие*	**light pulse**	*световой импульс*
conventional	*обычный, традиционный*	**to substitute**	*заменять,замещать*
glass fiber	*стекловолокно*	**capacity**	*мощность, способность*
contents	*содержание*	**accommodate**	*включать, охватывать*
to install	*устанавливать*	**interference**	*помеха, интерференция*
lightguide	*световод*	**carrier system**	*многоканальная система связи*
signal regenerator	*регенератор сигнала*	**protection**	*защита*

9.3. Read and translate the following word-groups paying attention to nouns as attributes.

Light-wave communication system, transmission system, glass fiber, voice signal, data signal, telephone conversation, telecommunication transmission, underground duct, copper cable, signal regenerator, carrier system, device reliability, laser beam, radio wave speed.

9.4. Match up the words which have a similar meaning.

1. concept	a. important
2. information	b. to operate
3. sophisticated	c. to demand
4. versatile	d. room
5. enormous	e. idea
6. speed	f. traditional
7. to undermine	g. data
8. single	h. many-sided
9. inexpensive	i. cheap
10.conventional	j. the only
11. significant	k. very large
12. to handle	l. to destruct
13. to require	m. rate
14. space	n. intricate

9.5. Read the text.

MODERN LIGHT-WAVE COMMUNICATION TECHNOLOGY

Not long ago the concept of using light pulses instead of electrical signals to transmit information was only a concept. Today, light-wave communication systems are among the most sophisticated transmission systems in the telecommunication network. They are at once efficient, versatile and relatively inexpensive to install and maintain.

The efficiency of light-wave systems is perhaps their most renowned quality. They carry enormous amounts of information over long distances at very high speeds. Consider, for example, the speed and capacity of the Bell System's long distance light-wave system. Light pulsing through a single, hair-thin glass fiber in this system can transmit the entire contents of Webster's dictionary – more than 2700 pages – over thousands of miles in only six seconds.

Not less impressive than this tremendous speed and capacity is the versatility of light-wave systems. As they are digital systems they can transmit easily any of these types of information: voice signals, high-speed data signals, and television signals. Without undermining quality or efficiency a single system can accommodate thousands of telephone conversations, and alternately handle data or video signals. Finally light-

wave systems are inexpensive to install and operate compared to their wire-and-cable counterparts. Moreover, they allow considerable savings.

The reasons for such savings stem from the technology of light-wave communication. Conventional telecommunication transmission is based on the conduction of electrons through metal (usually copper wires). Light-wave systems, however, substitute photons for electrons and glass fibers for copper. Since lightguide cables are only a fraction of the diameter and weight of copper cables they are easy to handle and take up far less space. They can be installed in existing underground ducts sometimes right next to copper cables.

In addition, light-wave systems are immune to electromagnetic interference, and therefore require no protection from it. Also, light can travel much farther through light-wave cables without regeneration than can electrons through copper carrier systems. This is because the light encounters little resistance from the very pure glass fiber through which it travels. Light-wave systems require significantly fewer signal regenerators than do electrical digital carrier systems: typically one every ten miles instead of one every mile.

9.6. Read the following statements and decide if they are true (T) or false (F).

1. Light-wave communication systems are not as efficient as conventional ones.
2. The versatility of light-wave systems is one of their most renowned qualities.
3. It is expensive to install and maintain light-wave systems.
4. In conventional systems electrons flow in a conductor.
5. Lightguide cables take up too much space.
6. It is not possible to place lightguide cables next to copper cables.
7. Electrical digital carrier systems require one regenerator every mile.

9.7. Answer the questions to the text.

1. Is the idea of using light pulses to transmit information new?
2. What are the qualities of light-wave communication systems?
3. What is their efficiency?
4. What is their versatility?
5. Are they cheaper to install and operate than their wire-and-cable counterparts?
6. Is there any difference between conventional and light-wave systems?
7. What is conventional transmission based on?
8. What is light-wave transmission based on?
9. Are light-wave systems immune to electromagnetic interference?
10. Why does light travel farther through light-wave cables without regeneration than electrons through copper wires?
11. How many signal regenerators every mile do light-wave systems require?

Text B

OPTICAL TECHNOLOGY

Pretext exercises

9.8. Read the words and try to guess their meaning.

Integrated, virtual, combine, laser, fabrication, silicon, regeneration, installation, destruct, reason, limitation, equivalent, intensive, connect, transcontinental.

9.9. Read the following words and notice their pronunciation.

increase (*n*)	[`ınkri:s]	reliability	[rı.laıə`bılətı]
virtually	[`və:ʧuəlı] [`və:tjuəlı]	simultaneously	[.sım(ə)l`teınıəslı]
medium	[`mi:dıəm]	fiber	[`faıbə]

Memorize the following words

fiber	*волокно*	**to replace**	*заменять,замещать*
to improve	*улучшать*	**to promise**	*обещать*
to increase	*увеличивать*	**performance**	*работа, эффективность*
increase	*увеличение*	**silicon**	*кремний*
reliable	*надежный*	**to amplify**	*усиливать*
reliability	*надежность*	**amplifier**	*усилитель*
to coat	*покрывать*	**surface**	*поверхность*
to apply	*применять, прикладывать*	**drive**	*дисковод, привод, накопитель*
application	*применение, приложение*		

9.10. Read the text.

OPTICAL TECHNOLOGY

One of the most interesting developments in telecommunication is the rapid progress of optical communication where optical fibers are replacing conventional telephone wires and cables. Just as digital technologies greatly improved the telephone system, optical communication promises a considerable increase in capacity, quality, performance and reliability of the global telecommunication network. New technologies such as optical fibers will increase the speed of telecommunication and provide new, specialized information service. Voice, computer data, even video

images will be increasingly integrated into a single digital communication network capable of processing and transmitting virtually any kind of information.

It is a result of combining two technologies: the laser first demonstrated in 1960 and the fabrication 10 years later of ultra-thin silicon fibers which can serve as lightwave conductors. Optical systems can transmit pulses of light as far as 135 kilometers without the need for amplification or regeneration.

A revolution in information storage is underway with optical disc technology.

The first digital optical discs were produced in 1982 as compact discs for music. They were further developed as a storage medium for computers. The discs are made of plastics coated with aluminium. The information is recorded by using a powerful laser to imprint bubbles on the surface of the disc. A less powerful laser reads back the pictures, sound or information. An optical disc is almost indestructible and can store about 1000 times more information than a plastic disc of the same size.

One CD-ROM disc (650 MB) can replace 300,000 pages of text, which represents a lot of savings in databases.

The future of optical storage is called DVD (digital versatile disc). A DVD-ROM can hold up to 17 GB, about 25 times an ordinary CD-ROM. For this reason it can store a large amount of multimedia software and complete full-screen Hollywood movies in different languages. However, DVD-ROMs are "read-only" devices. To avoid this limitation companies also produce DVD rewritable drives.

Besides, it is reported that an optical equivalent of a transistor has been produced and intensive research on optical electronic computers is underway at a number of US companies as well as in countries around the world.

It is found that optical technology is cost-effective and versatile. It finds new applications every day – from connecting communication equipment or computers within the same building or room to long-distance transcontinental, transoceanic and space communications.

9.11. Fill in the blanks with the following words.

capacity	**as well**	**laser**	**information**	**light**	**existing**
advantage	**space**	**doubt**	**amplified**	**cost**	**conventional**

Optical fibers are made of glass and use (1) … (usually from a (2) …) to transmit messages. There is no (3) … optical fiber systems have enormous (4) … over (5) … transmission systems. They have a much higher (6) … than copper wires, can carry much more (7) … and have a potentially lower material (8) … . Besides, optical fibers occupy far less (9) … . The quality of transmission is high (10) … . The signal doesn't need to be (11) … as often as with (12) … cables. Optical fibers don't suffer from interference.

9.12. Read the following statements and decide if they are true (T) or false (F).

1. Optical fibers are replaced by conventional telephone wires.
2. Optical systems transmit light pulses without any regeneration.
3. The first digital optical discs were produced as compact discs for music.
4. Digital optical discs can't be used as a storage medium for computers.
5. The information is recorded and read by laser.
6. CD-ROM can store much more information than DVD-ROM.
7. DVD-ROMs are "read-only" devices.

9.13. Answer the questions to the text.

1. What does optical communication promise?
2. What is a digital communication network capable of?
3. What are two combined technologies?
4. Do optical systems need any amplifiers or regenerators?
5. When were the first digital optical discs produced?
6. How is the information recorded and read?
7. What are the advantages of optical discs?
8. Are there any disadvantages? What are they?
9. How do the companies try to avoid the problem?
10. Are optical electronic computers used today?

GRAMMAR

Absolute Participle Constructions, Gerund Construction

9.14. Translate the following sentences paying attention to absolute participle construction.

1. The choice having been made, all the other alternatives have been rejected.
2. The other conditions being equal, the acceleration will be the same.
3. The equipment failed, the explorers stopped the experiment.
4. We carried out a series of reactions, the raw materials brought from their laboratory.
5. With water being cooled, the rate of the reaction was low.
6. The reaction must have taken place, with the data showing a change in the infra-red region.
7. With the structure of various companies being different, the model is often inadequate in each particular case.
8. They took all the measurements during actual operation of the machine, this being the usual practice in those days.
9. The cars at that time were very small, the engine being placed under the seat.
10. Brakes having become more efficient, cars achieved greater reliability.

9.15. Translate the following sentences. Point out the absolute participle II construction.

1. The results obtained, we informed the manager of this fact.
2. The data coded, we finished our work.
3. All the delegations met, the conference began.
4. The article translated, he returned the dictionary.
5. The research finished, the scientists made the analysis of the data obtained.
6. The session was over, with many aspects of the problem left unsolved.
7. All factors considered, we believed that the mechanism is the most likely.
8. All the equipment removed, the explorers stopped working.

Gerund Construction

9.16. Read and translate the sentences paying attention to the gerund construction.

1. We know of Kondakov's having made the first synthetic rubber in the world.
2. We know of Yoffe's having contributed much to the research of transistors.
3. I have heard of their experiment being successfully completed soon.
4. This scientist's taking part in the design of the new data processing system was of great help for us.
5. We were told about their having studied a number of problems connected with the development of computing machinery.
6. Mankind is interested in atomic energy being used only for peaceful purposes.
7. Benjamin Franklin's having invented the first lightning conductor is a well established fact.
8. We all know of their designing a new type of computer.
9. He mentioned his having shown these slides at the conference.
10. Your having worked at the plant helped you to master technical subjects.
11. Kurchatov's having devoted all his life to nuclear physics is well known.
12. I know of their being shown the new device.
13. We know of the Curies' having discovered some new radioactive elements.
14. They were told of Rutherford's having investigated the nature of alpha-particles.
15. There was no hope of our solving this complex engineering problem so soon.
16. Alexander Bell's being a teacher of deaf people influenced his interest in sound and its transmission.

9.17. Choose the sentences with the Absolute Participial Construction from the ones given below. Translate them into Russian.

1. Speaking about the new methods of work the engineer told us many interesting details.
2. There are two diagrams in this figure, one of them showing the relation between volume and temperature.
3. Special instruments measuring cosmic radio signals are being installed in the observatory.

4. We defined the volume, all the measurements having been done according to the instruction.
5. The computer performing addition, two numbers to be added come from the memory.
6. While improving the design the constructor made many calculations.
7. A lot of attempts having been made, the scientist came to a successful solution of the problem.
8. Having stated the laws of gravity, Newton was able to explain the structure of the Universe.
9. The first man-made satellite having been sent up, it became possible to investigate various types of radiation.
10. Having published his book about space exploration in 1895, Tsiolkovsky became known all over the world.
11. Part of the energy being changed into heat, not all the chemical energy of the battery is transformed into electric energy.

9.18. Read and translate the sentences paying attention to the participle and gerund constructions.

1. With the current being switched on, the machine automatically starts operating.
2. We know of his working at the problem of protection from radioactivity.
3. His going home so early caused a storm of protest.
4. An electron leaving the surface, the metal becomes positively charged.
5. Belyaev's having been elected a correspondent member of the Academy of Sciences was met with satisfaction.
6. Other things being equal, the electron energy values remain constant.
7. His work being criticized makes him revise his method.
8. In spite of the gases having been compressed they returned to their original volume as soon as the applied force stopped acting.
9. Your having written a letter is really no excuse for your not being at a proper time on the fixed day.
10. The temperature being raised, the kinetic energy is increased.
11. Our being invited to take part in such a conference is very important.
12. There is no hope of our getting all the necessary information on this subject.
13. With the structure of various companies being different, the model is often inadequate in each particular case.
14. Some scientists do not distinguish between pure and applied mathematics, the distinction being, in fact, of recent origin.
15. Several treatments of this problem have been presented, with theories resulting from this investigation falling into one of the two categories.
16. Instructions being obtained, the control unit causes other units to perform the necessary operations.
17. Newton's having made a mistake in his calculations has no influence on his theory.
18. He mentioned his having tested this particular material for strength.

Unit 10. NEUTRINO

Text A *Communicating through the Earth*
Text B *What is GPS?*

Grammar: **infinitive constructions**

Text A

COMMUNICATING THROUGH THE EARTH

Pretext exercises

10.1. Read the following words and notice their pronunciation.

neutrino	[nju:`trɪnəu]	nucleus	[`nju:klɪəs]
earth	[ə:θ]	surface	[`sə:fɪs]
curve	[kə:v]	straight	[streɪt]
occasionally	[ə`keʒənləlɪ]	induce	[ɪn`dju:s]
eventually	[ɪ`ventʃualɪ]	intelligent	[ɪn`telɪʤənt]
molecule	[`mɔlɪkju:l]		

10.2. Read the words and try to guess their meaning.

Horizon, copper, relay, region, ionosphere, solar, storm, subatomic, matter, detect, molecule, induce, combine, code, civilization.

Memorize the following words

curve	*кривая линия*	**to relay**	*ретранслировать*
mirror	*зеркало*	**to disrupt**	*прерывать*
to induce	*вызывать*	**earth's crust**	*земная кора*
straight line	*прямая линия*	**to take place**	*происходить*
to maintain	*поддерживать*	**maintenance**	*эксплуатация, поддержание*
fluid	*жидкость*	**to unite**	*объединять*
to affect	*влиять, воздействовать*		

10.3. Read the text.

COMMUNICATING THROUGH THE EARTH

How do we communicate with people beyond the horizon? What can be made to follow the curve of the earth's surface?

Of course, we can send electrical signals though wires around any curves. In the 19-th century copper wires were strung across the continents and the world was united through telegraphy. That takes a lot of copper and a lot of maintenance.

We could send light-wave signals and do away with wires, but light waves move in a straight line and won't curve around the earth's bulge. We would have to set up relay stations or place mirrors in orbit to make that work.

We could use radio waves. They travel in straight lines too but the upper atmosphere contains regions rich in charged particles (the ionosphere) that tend to reflect the radio waves. That makes it possible to send radio signals long distances, and in the 20-th century the world was united without wires.

However, the ionosphere is affected by the solar wind. When the sun produces flares, an electrical storm can take place that will disrupt radio communications. But short radio waves (microwaves) can go right through the ionosphere and be sent on by communication satellites. As communication satellites improve, signals will be sent from place to place on earth with so little trouble that it would seem unreasonable to ask for anything better.

What can go through the earth itself? Light certainly can't. Radio waves can't. We can't even string wires through the earth to carry electrical signals. But there are certain massless subatomic particles called neutrinos that travel at the speed of light and go through matter as though it weren't there. A beam of neutrinos could travel through trillions of miles of solid lead and come out the other end just about unaffected. Neutrinos reach us from any direction and pass through the earth in less than a twentieth of a second.

This doesn't mean that neutrinos can't be detected. Out of many trillions one neutrino may occasionally combine with an atomic nucleus and induce a detectable change. Thus, huge vats of cleaning fluid made up of molecules that include chlorine atoms can serve as a "neutrino telescope". Such neutrino telescopes can be placed in mines, a couple of miles under the earth's crust. In that case nothing can reach them but neutrinos.

Scientists can produce neutrino beams without much trouble. The day may come when improved neutrino telescopes, using water rather than cleaning fluid, will be placed all over the earth. Eventually television sets might be built that would incorporate the equivalent of neutrino telescopes and convert the signals directly into sight or sound.

If this could be done, communication satellites would be unnecessary. Any two points on earth's surface (or in mines, or under the sea) would be connected by a

mathematically straight line along which neutrinos would move at the speed of light. There is no way of communicating more quickly.

Neutrinos move in a straight line throughout the universe. They are unaffected by the electromagnetic fields and dust clouds that can disrupt or block microwaves and light.

In the end, then, it may be that communications among worlds would be carried out through neutrino beams.

Perhaps that is why we aren't detecting signals from other intelligent civilizations out there. We are looking for beams of microwaves, but perhaps we should be looking for beams of neutrinos.

10.4. Read the following statements and decide if they are true (T) or false (F).

1. Light wave signals can't be used for communication without mirrors.
2. Short radio waves are reflected by ionosphere.
3. A beam of neutrinos can pass through the earth.
4. It is impossible to detect neutrino.
5. Neutrino telescopes are placed on the earth's surface all over the world.
6. Today neutrinos are widely used for communication.
7. Scientists should use beams of neutrinos to detect signals from other intelligent civilizations.

10.5. Answer the questions to the text.

1. Are copper wires used for communication?
2. How do light waves propagate?
3. Is it possible to use them for communication?
4. What is ionosphere?
5. What waves does ionosphere reflect?
6. Can light waves pass through the earth?
7. What is neutrino?
8. Are neutrinos used for communication today?
9. Can they be detected? How?
10. What is the future of neutrino?
11. How do scientists try to detect signals from other intelligent civilizations?

Text B

WHAT IS GPS?

Pretext exercises

10.6. Read the following words and notice their pronunciation.

available	[ə`veɪləbl]	precise	[prɪ`sais]
latitude	[`lætɪtju:d]	longitude	[`lɔnʤɪtju:d]
altitude	[`æltɪtju:d]	launch	[lɔ:nʧ]
weigh	[weɪ]	error	[`erə]

10.7. Read the following words and try to guess their meaning.

Global, position, satellite, navigation, military, location, display, speed, extreme, accurate, channel, design, solar, correct, degrade, atmosphere, reflect, terrain, block.

Memorize the following words

to intend	*намереваться, предназначать*	**precise**	*точный*
location	*расположение*	**precision**	*точность*
latitude	*широта*	**to track**	*следить, отслеживать*
longitude	*долгота*	**destination**	*место назначения*
altitude	*высота*	**booster**	*ускоритель*
to run	*работать*	**path**	*путь*
to launch	*запускать*	**to degrade**	*ухудшать*
to cause	*вызывать*	**onboard**	*на борту, бортовой*
error	*ошибка*		

10.8. Read the text.

WHAT IS GPS?

The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites. GPS was originally intended for military applications, but now the system is available for civilian use. GPS works in any weather conditions, anywhere in the world, 24 hours a day.

The first GPS satellite was launched in 1978. Each satellite is built to last about 10 years. Replacements are constantly being built and launched into orbit. A GPS satellite weighs approximately 2,000 pounds and is about 17 feet across. Transmitter power is only 50 watts or less.

GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to Earth. GPS receivers take this information and calculate the user's exact location. Essentially, the GPS receiver compares the time a signal was transmitted by a satellite with the time it was received. The time difference tells the GPS receiver how far away the satellite is. Now, with distance measurements from a few more satellites, the receiver can determine the user's position and display it on the unit's electronic map.

A GPS receiver must be locked on to the signal of at least three satellites to calculate a 2D position (latitude and longitude) and track movement. With four or more satellites in view, the receiver can determine the user's 3D position (latitude, longitude and altitude). Once the user's position has been determined, the GPS unit can calculate other information, such as speed, track, trip distance, distance to destination, sunrise and sunset time and more.

Today's GPS receivers are extremely accurate within an average of three to five meters thanks to their parallel multi-channel design.

24 satellites are orbiting the earth about 12,000 miles above us. They are constantly moving, making two complete orbits in less than 24 hours. These satellites are traveling at speeds of roughly 7,000 miles an hour.

GPS satellites are powered by solar energy. They have backup batteries onboard to keep them running in the event of a solar eclipse, when there is no solar power. Small rocket boosters on each satellite keep them flying in the correct path.

GPS satellites transmit two low power radio signals. The signals travel by line of sight, meaning they will pass through clouds, glass and plastic but will not go through most solid objects such as buildings and mountains.

Some factors that can degrade the GPS signal and thus affect the accuracy include the following:

- The satellite signal slows as it passes through the atmosphere.
- The GPS signal is reflected off objects such as tall buildings before it reaches the receiver. This increases the travel time of the signal, thereby causing errors.
- A receiver's built-in clock is not as accurate as the atomic clocks onboard the GPS satellite. Therefore, it may have very slight timing errors.
- The more satellites a GPS receiver can "see", the better the accuracy. Buildings, terrain, electronic interference, or sometimes even dense foliage can block signal reception, causing position errors or possibly no position reading at all. GPS units typically will not work indoors, underwater or underground.

10.9. Read the following statements and decide if they are true (T) or false (F).

1. GPS is used only for military purposes.
2. The receiver displays the user's position on the electronic map.
3. To calculate a 3D position the receiver must be locked on to the signal of three satellites.
4. The accuracy of the GPS receiver is far from being high.
5. Backup batteries are used when there is no solar power.
6. Low power radio signals will not pass through solid objects.
7. GPS units operate well in any environment.

10.10. Translate the sentences from Russian into English.

1. Чтобы использовать световые волны для связи, на орбите необходимо устанавливать зеркала.
2. Радиоволны распространяются по прямой линии.
3. Ионосфера отражает длинные волны.
4. Микроволны не отражаются ионосферой, а проходят через неё.
5. Ученые могут обнаружить нейтрино с помощью телескопов, которые устанавливают под землёй.
6. Нейтрино не подвергается воздействию электромагнитных полей.
7. GPS – это система, состоящая из 24 спутников.

8. GPS приёмники – это очень точные устройства благодаря параллельной многоканальной конструкции.
9. Сигналы от GPS спутников не могут проходить через высокие здания и горы.
10. Когда сигнал проходит через атмосферу, его скорость уменьшается.
11. Точность GPS систем зависит от количества спутников.
12. Недостатком GPS устройств является то, что они не работают в помещении, под водой, под землёй.

10.11. Answer the questions to the text.

1. What is the GPS?
2. What is it used for?
3. Do weather conditions affect the GPS operation?
4. How does the unit determine the user's position?
5. What information can GPS unit calculate?
6. How are GPS satellites powered?
7. What is the function of backup batteries?
8. What is the weight and size of a GPS satellite?
9. Do signals from GPS satellite pass through any object?
10. Is there anything that affects the accuracy of the GPS signal? What?
11. Are there any disadvantages of the GPS units? What?

GRAMMAR

Infinitive Constructions

Complex Object and Complex Subject

10.12. Point out the complex object in the following sentences and translate them.

1. An engineer wanted the device to be examined in this laboratory.
2. We know electrons to be negatively charged particles.
3. We know the data to be translated into direct distance or range.
4. A scientist said a new device to give a high accuracy.
5. Experts know vacuum tubes to amplify the voltage.
6. We all surprised him to become a good engineer.
7. They considered the idea to be reasonable.
8. We know physical changes to be caused by heat.
9. They assume the information to be correct.
10. He believed the results of this test to have been plotted in the diagram.
11. We cannot expect a complicated problem like that of using solar energy to be solved in a year or so.

10.13. Point out the complex subject in the following sentences, as in the model.

Model: – **They** are expected **to come** to an agreement.

1. The problem is shown to be urgent.
2. The instrument seems to have been tested.
3. The result is certain to be valid.
4. Printers are known to vary greatly in performance and design.
5. The figures are considered to be reliable.
6. The effect is known to be due to radiation.
7. The results are reported to contradict the idea.
8. He is known to be a good specialist.
9. The article is said to have become the scandal of the week.
10. In ancient time the Earth was thought to be motionless.

Infinitive Construction with *for*

10.14. Translate the following sentences. Point out the infinitive construction with *for*.

Model: – This question is easy enough **for me to solve**.

1. This situation is too complex for us to understand.
2. This work is simple enough for him to do.
3. This equation is too difficult for me to solve.
4. There is no reason for computer experts to use computers of the first generation nowadays.
5. For these experiments to be meaningful the observations must be made at regular intervals.
6. For me to learn to speak English fluently is not easy.
7. The text was very interesting but rather difficult for the students to translate it without a dictionary.
8. For the results to be valid our technique should be used in combination with statistical analysis.

Revising Infinitive Constructions

10.15. Read and translate the following sentences. Pay attention to the infinitive constructions.

1. We know silver to be the best of conducting materials.
2. We expect the article to be published next year.
3. We want them to receive this information as soon as possible.
4. The only thing for you to do is to use the microscope.
5. We are sure this work to be completed in a month.
6. Our professor wants us to use these data.
7. For the decision to be correct all the facts must be taken into consideration.
8. These elements are known to have been found two decades ago.

9. Semiconductors are shown to be good detectors of radio waves.
10. This engineer appears to have presented some interesting data.
11. The improvement of the technological processes is supposed to ensure lower cost of power.
12. Long transmission lines are known to be necessary for the transfer of electric energy over long distances.
13. Some types of reactors are known to produce more nuclear fuel during their operation than they consume.
14. Infrared rays emitted by an object on the road are to be intensive enough for sensors to pick them up.
15. Scientists expect lasers to solve the problem of controlled thermonuclear reaction.
16. Japanese designers believe a new ceramic engine to replace the conventional one.
17. We know the first digital optical discs to have been produced in 1982 as discs for music.
18. The students are waiting for the lecturer to describe the properties of a new composite material.
19. A system of satellites is provided for people to watch the central TV program.
20. Intensive research on optical electronic computer is said to be going on in a number of US companies.
21. A method for recording information on crystal by means of laser is known to have been developed by a Russian researcher.
22. Optical technology has been found to be cost-effective.
23. Lasers appeared to be highly useful for solving the problem of controlled thermonuclear reaction and communication.
24. A system of Earth satellites appears to have solved the problem of transmitting the central TV program to any part of the world.
25. Electricity proved to be able to travel instantly over a long piece of wire.
26. A new manned craft is reported to be able to submerge to the depth of 21,000 feet.
27. Radio navigation stations are known to be located all over the world to guide the pilots.
28. The phenomenon of superconductivity appears to have been discovered as early as 1911.
29. M. Faraday supposed a light beam to reverse its polarization as it passed through a magnetized crystal.
30. A Dutch physicist found a superconducting material to return to normal state when a strong magnetic field was applied.
31. Properties of materials obtained in space prove to be much better than those produced on Earth.
32. There are prospects for lasers to be used in long distance communication and for transmission of energy to space stations.

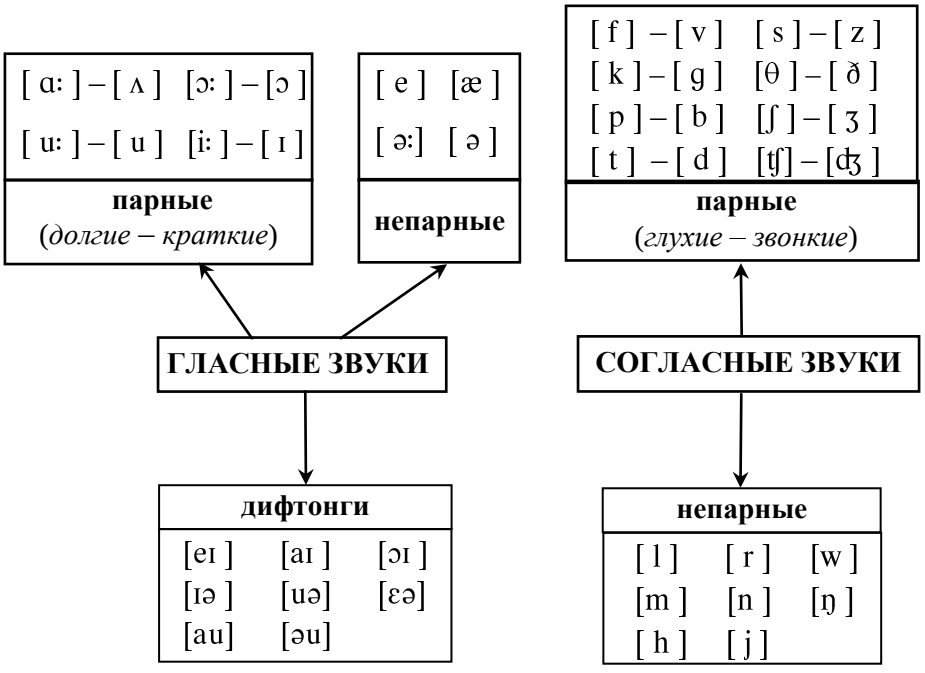
APPENDICES

ПРИЛОЖЕНИЕ 1

Английский алфавит

A a	[eɪ]	**N n**	[en]
B b	[biː]	**O o**	[əu]
C c	[siː]	**P p**	[piː]
D d	[diː]	**Q q**	[kjuː]
E e	[iː]	**R r**	[ɑː]
F f	[ef]	**S s**	[es]
G g	[ʤiː]	**T t**	[tiː]
H h	[eɪʧ]	**U u**	[juː]
I i	[aɪ]	**V v**	[viː]
J j	[ʤeɪ]	**W w**	[`dʌbljuː]
K k	[keɪ]	**X x**	[eks]
L l	[el]	**Y y**	[waɪ]
M m	[em]	**Z z**	[zed]

Знаки транскрипции



Правила чтения

Тип слога	A a	E e	I i	O o	U u	Y y
Открытый слог (оканчивается на гласную или **e** немую)	[eɪ] *case*	[ɪ] *she*	[aɪ] *line*	[əu] *zone*	[juː] *rude*	[aɪ] *my*
Закрытый слог (оканчивается на согласную)	[æ] *tank*	[e] *bet*	[ɪ] *bit*	[ɔ] *lot*	[ʌ] *cut*	[ɪ] *myth*
Гласная + **r** и гласная + **r** + согласная	[ɑː] *car park*	[əː] *her term*	[əː] *sir third*	[ɔː] *or born*	[əː] fur *burn*	[əː] Cyrd
Гласная + **r** + гласная	[ɛə] *vary*	[ɪə] *here*	[aɪə] *tire*	[ɔː] *story*	[juə] *pure*	[aɪə] *tyre*

ПРИЛОЖЕНИЕ 2

Основные способы словообразования

Аффиксация (суффиксация и префиксация)

Основные суффиксы существительных

Суффиксы	Примеры	Перевод
-er **-or**	to read – reader to elect – elector	читать – читатель избирать – избиратель
-ant **-ent**	to assist – assistant to study – student	помогать – помощник изучать – студент
-ian	academy – academician	академия – академик
-ist	to type – typist	печатать – машинистка
-tion **-ation** **-sion** **-ssion**	to connect – connection to organize – organization to collide – collision to admit – admission	соединять – соединение организовывать – организация сталкиваться – столкновение допускать – допущение
-age	to clear – clearage	очищать – очистка
-ment	to fulfil – fulfilment	выполнять – выполнение
-ure	to press – pressure	давить – давление
-ance **-ence**	to appear – appearance to depend – dependence	появляться – появление зависеть – зависимость
-ing	to begin – beginning	начинать – начало
-ness	dark – darkness	темный – темнота
-ity **-th**	active – activity wide – width	активный – активность широкий – ширина
-dom **-ism** **-hood** **-ship**	free – freedom real – realism child – childhood friend – friendship	свободный – свобода действительный – реализм ребенок – детство друг – дружба

Основные суффиксы прилагательных

Суффиксы	Примеры	Перевод
-ant **-ent** **-ive**	to tolerate – tolerant to differ – different to act – active	терпеть – терпимый различаться – непохожий, другой, отличный (от) действовать – активный
-ful **-al**	use – useful centre – central	польза – полезный центр – центральный
-ic **-ous**	history – historic advantage – advantageous	история – исторический преимущество – выгодный
-y **-ly**	dirt – dirty day – daily	грязь – грязный день – ежедневный
-less (переводится приставкой *без-*, *с-*)	noise – noiseless	шум – бесшумный
-ish	old – oldish	старый – староватый

Основные суффиксы глаголов

Суффиксы	Примеры	Перевод
-en **-ify**	strength – to strengthen simple – to simplify	сила – усиливать простой – упрощать
-ize **-ate**	real – to realize active – activate	настоящий – осуществлять активный – активизировать

1.1. Form nouns adding the suffixes *-er, -or, -tion* to the given words.

To operate, to receive, to produce, to transmit, to invent, to discover, to visit, to convert, to regulate, to accumulate, to react, to use, to oscillate, to record, insulate, receive, accelerate, communicate, act, revolt, classify, conduct, transmit, investigate, apply, emit.

1.2. Form nouns adding the suffixes -ment or -ity to the given words.

To develop, to achieve, active, able, complex, to move, dense, electric, to measure, to improve, to manage, intense, intense, conductive, capable, to require, special, flexible.

1.3. Form adjectives adding the suffixes *-ant, -ent, -ive, -ful, -al, -ic, -ous to* the given words.

Economics, collection, industry, importance, electricity, illustration, technology, physics, difference, history, advantage, experiment.

1.4. Form nouns adding the suffixes *a) –less; b) –ness.* Translate the words.

a. Home, power, hope, sense, weight, shape, use, wire, noise, help, harm, life.
b. Effective, useful, bright, soft, thick, weightless, shapeless, empty.

1.5. Complete the table.

Verb	Noun	Adjective/ Participle
reflect	reflection	reflecting
manufacture	…	manufactured
…	…	long
…	preparation	…
magnetize	…	
…	…	reproduced
…	track	…
amplify	…	…
…	…	driven
convert	…	…
feed		fed
…	continuation	…
respond	…	…

1.6. Read and translate the derivatives paying attention to the suffixes.

1. **to transform** – transformer, transformation
2. **to demonstrate** – demonstration, demonstrative
3. **to calculate** – calculation, calculator
4. **to add** – additional, addition
5. **to differ** – different, difference, differential
6. **to compute** – computer, computation
7. **to use –** usage, user

1.7. Translate the following words. Point out verbs.

1. memory	memorize	memorial
2. wide	width	widen
3. separation	separable	separate
4. realize	real	reality
5. creation	creative	create
6. classify	classification	classical
7. action	active	activate

1.8. Give the English equivalents of the words in bold.

1. **устанавливать** – installment, installation, install
2. **стабилизировать** – stabilizer, stability, stabilize
3. **упрощать** – simplify, simple, simplification
4. **регулировать** – regular, regulation, regulate
5. **генерировать** – generation, generate, general

1.9. Read the following words and decide to what parts of speech they belong to.

Information, digital, television, conversation, conventional, protection, carrier, typically, inexpensive, versatility, data, relatively, conduction, equipment, interference, resistance, regenerator.

1.10. Read and translate the words paying attention to the suffixes.

Greatly, lecturer, atmospheric, successful, improvement, inventor, radiation, equipment, economic, powerful, development, operation, atomic, agreement, regulation, instruction, communication, generation, separately, production, industrial, researcher, radioactivity, measurement, interaction, elimination, seriously, symbolic, ecological, organizer, possible, differently, impossibility, rapidly, importance, technologically, economist, automatically, universal, manufacturer, productivity, operation, substitution, greatly, increasingly, dependent, independence, independently, correspondence, resistive, intensity, simplify, classification, magnetize, diversity, replacement, affectively, variable, variety, completely, impressive, conversation, conventional, carrier, typically, addition, equipment.

1.11. Form nouns, adjectives or adverbs and fill in the blanks. Read and translate the sentences.

PHYSICS

1. It is … impossible to be in two places at once.
2. … is an expert dealing with matter and energy.
3. Mechanical laws and Newtonian … are very important for creating virtual systems.
4. The equivalent of clip art for virtual reality designers might be … systems.

POSSIBILITY

5. What will make the virtual reality design system of tomorrow …?
6. Is there any … of your taking part in virtual reality conference this year?
7. If we throw an object, it flies across the room, … hitting another object and causing a complex chain of events as objects crash into each other.

SUCCESS

8. Virtual reality can have great … in many ways, especially in experimenting.
9. Recent … tests of the world's largest simulator enable scientists to do research in education, management and industry.
10. Astronauts have … simulated Space Shuttle landing.

POTENTIAL

11. Virtual laboratory helps researchers simulate … complicated flight situations.
12. Our country has great … raw resources.
13. It has not realized its full … yet.

Префиксы с отрицательным значением

Префиксы	Примеры	Перевод
un- не- без (с)-	known – unknown limited – unlimited	известный – неизвестный ограниченный – безграничный
il- **im-** **in-** **ir-** не- без (с)-	logical – illogical polite – impolite accuracy – inaccuracy regular – irregular	логичный – нелогичный вежливый – невежливый точность – неточность регулярный – нерегулярный
non- не- без- (с)-	conductor – non-conductor	проводник – непроводник (изолятор)
dis- раз- не-	to connect – to disconnect ability – disability	соединять – разъединять способность – неспособность
anti- анти-	war – antiwar	военный – антивоенный
mis- означает «неверно»	to print – to misprint	печатать – сделать опечатку

Префиксы с разными значениями

Префиксы	Примеры	Перевод
super- сверх-	man – superman	человек (мужчина) – сверхчеловек (супермен)
over- пере-, над-	to heat – to overheat	нагревать – перегревать
sub- ниже-, под- и др.	dean – subdean system – subsystem	декан – заместитель декана система – подсистема
en- (*для образования глагола*)	large – to enlarge	большой – увеличить

post- после- **pre-** до- заранее-	war – post(-)war heat – preheat	война – послевоенный нагреть – предварительно нагреть
re- снова, еще раз	to write – to rewrite to use – to reuse to elect – to re-elect (*пишется через дефис*)	писать – переписывать использовать – снова использовать избирать – переизбирать
semi- полу-	conductor – semiconductor	проводник – полупроводник
inter- меж(ду)- взаимо-	change – interchange	обмен – взаимообмен

1.12. Form adjectives adding the prefix un- to the following adjectives and translate them.

Complicate, completed, human, stable, limited, like, satisfactory, natural, discovered, important.

1.13. Form words with negative prefixes *un-, in-, ir-, il-, dis-, non-.*

Importance, reliability, flexibility, ability, easy, expensive, advantage, relevant, conductor, suitable, regular, logical, connect, legal, print, limited.

1.14. Form verbs using prefixes *en-, re-, dis-, mis-, pre-, over-, under-, de-.*

Large, case, arrange, tell, agree, appear, understand, determine, load, estimate, stabilize, heat.

1.15. Point out the words with negative prefixes.

1. semiconductor	recharge	non-conductive
2. misinform	interchange	overheat
3. misunderstanding	submarine	enlarge
4. reuse	non-stop	important
5. ultrasonic	antifreeze	superconductivity
5. postwar	inexpensive	enlarge